SIEMENS

MAMMOMAT 1000/3000

SP

Wiring Diagrams

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MAMMOMAT 1000

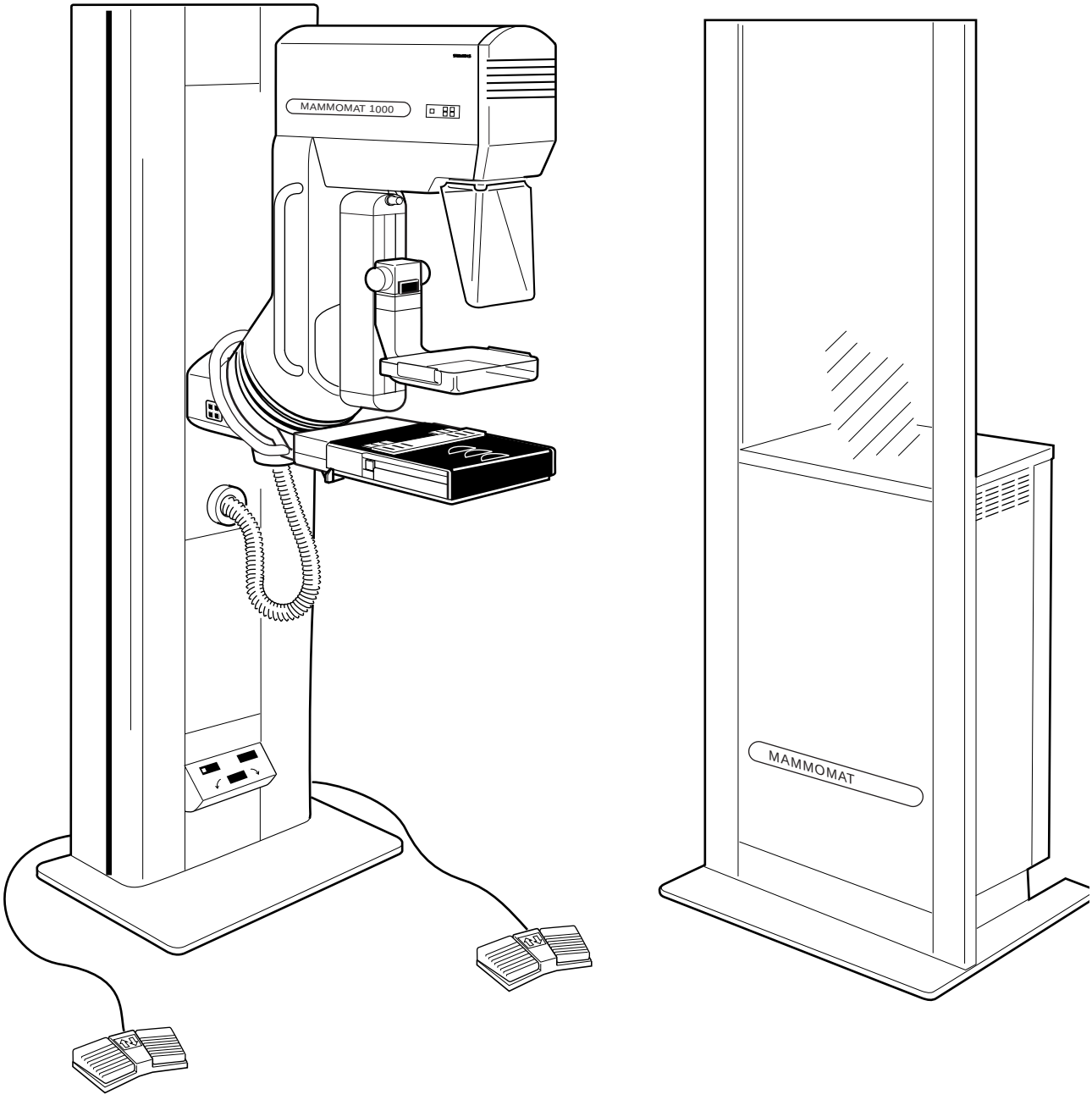


Fig. 1 Mammomat 1000 with generator with integrated control panel and radiation shield.

MAMMOMAT 1000 WITH REMOTE CONTROL

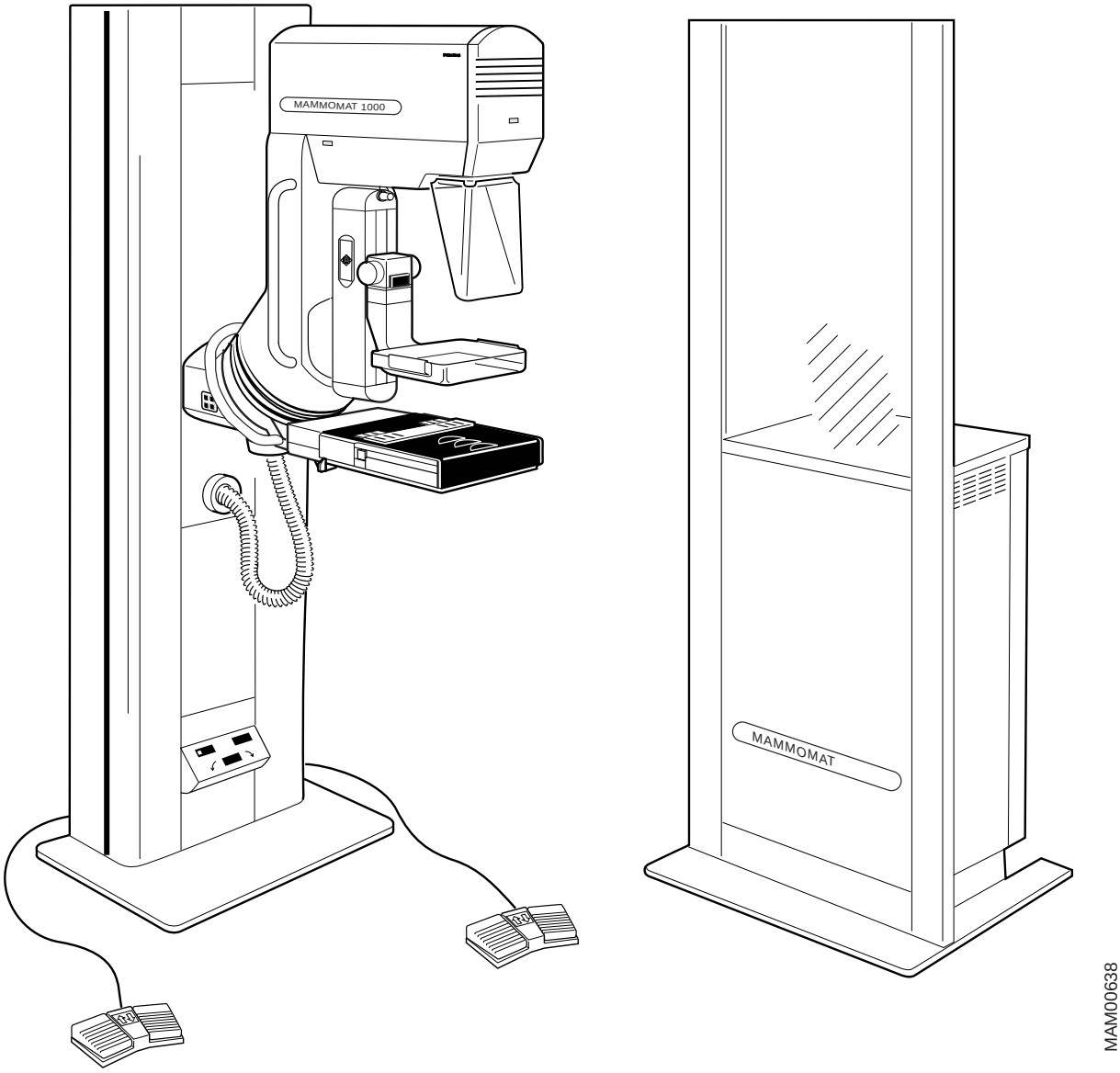


Fig. 2 Mammomat 1000 generator with integrated control panel and radiation shield.

MAMMOMAT 3000

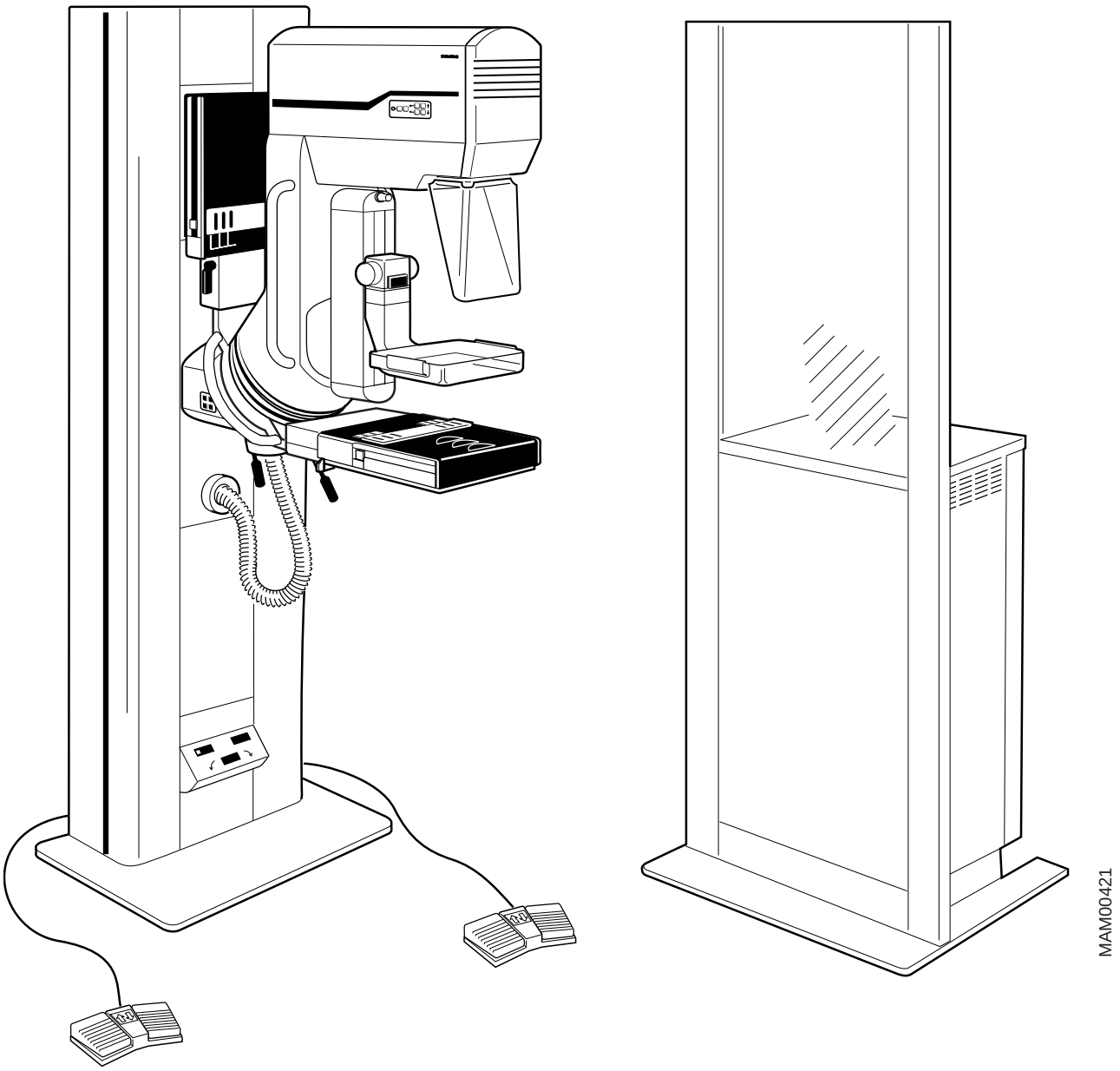


Fig. 3

MAMMOMAT 3000 installation with pivoted object-table arm and generator with integrated control panel and radiation shield.

Alternatively, the control panel and the radiation shield can be separated from the generator, see overleaf.

MAMMOMAT 1000/3000

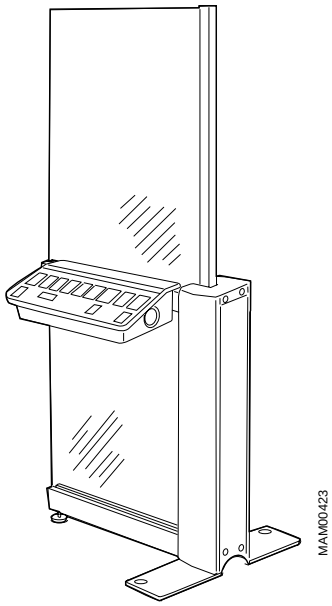


Fig. 4 Free-standing radiation shield with separate controle console

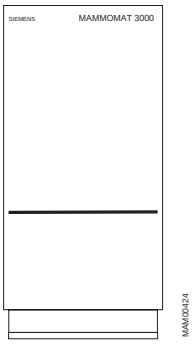


Fig. 5 Separate generator

MAMMOMAT 3000

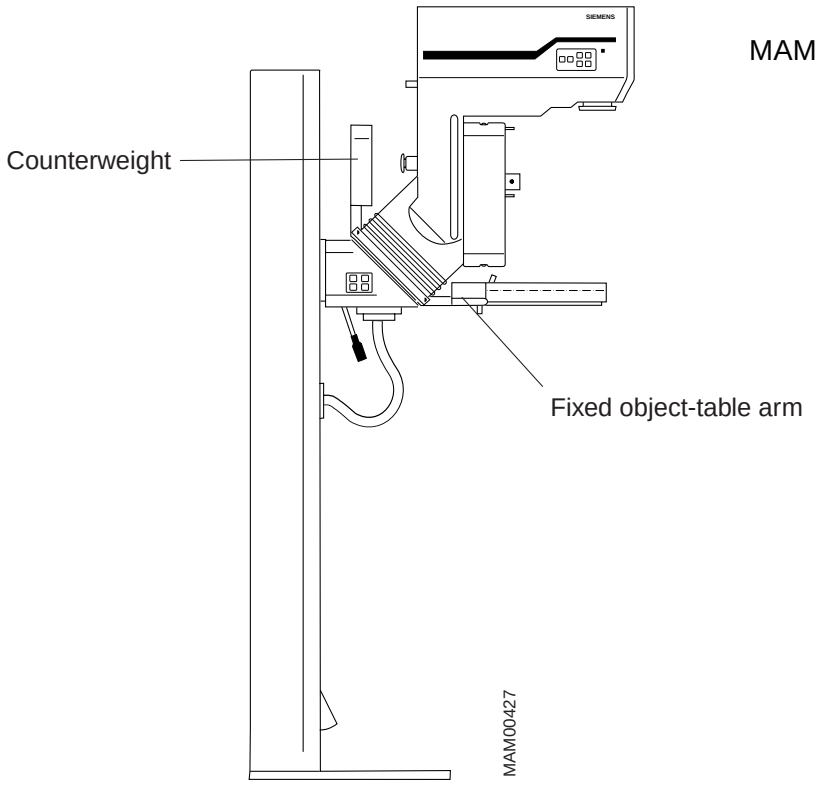
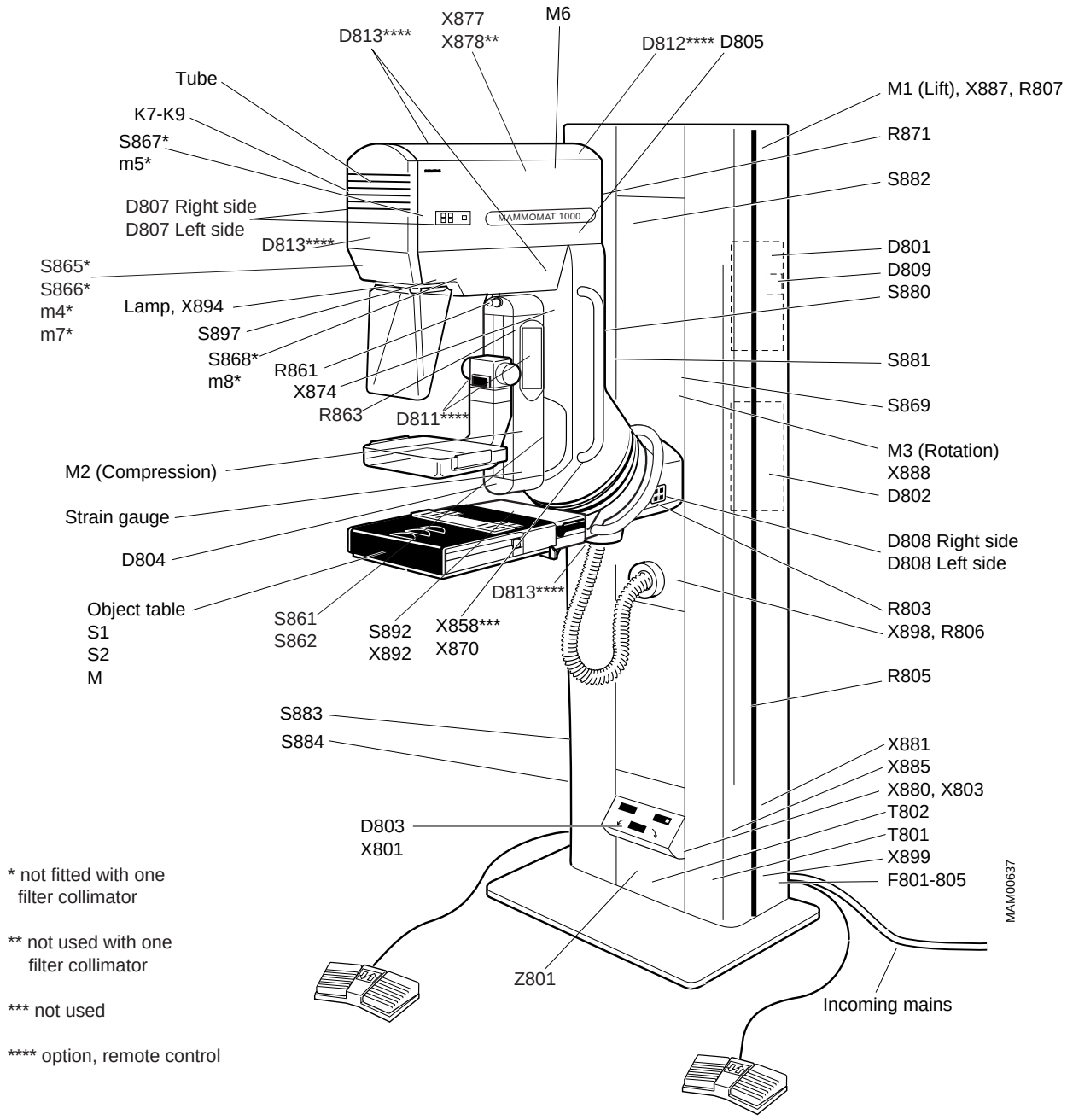


Fig. 6 Stand with fixed object-table arm

Pivoted object-table arm (“flying wing”) replaced by fixed object-table arm and counter-weight.

MAMMOMAT 1000



* not fitted with one filter collimator

** not used with one filter collimator

*** not used

**** option, remote control

Fig. 7

MAMMOMAT 3000

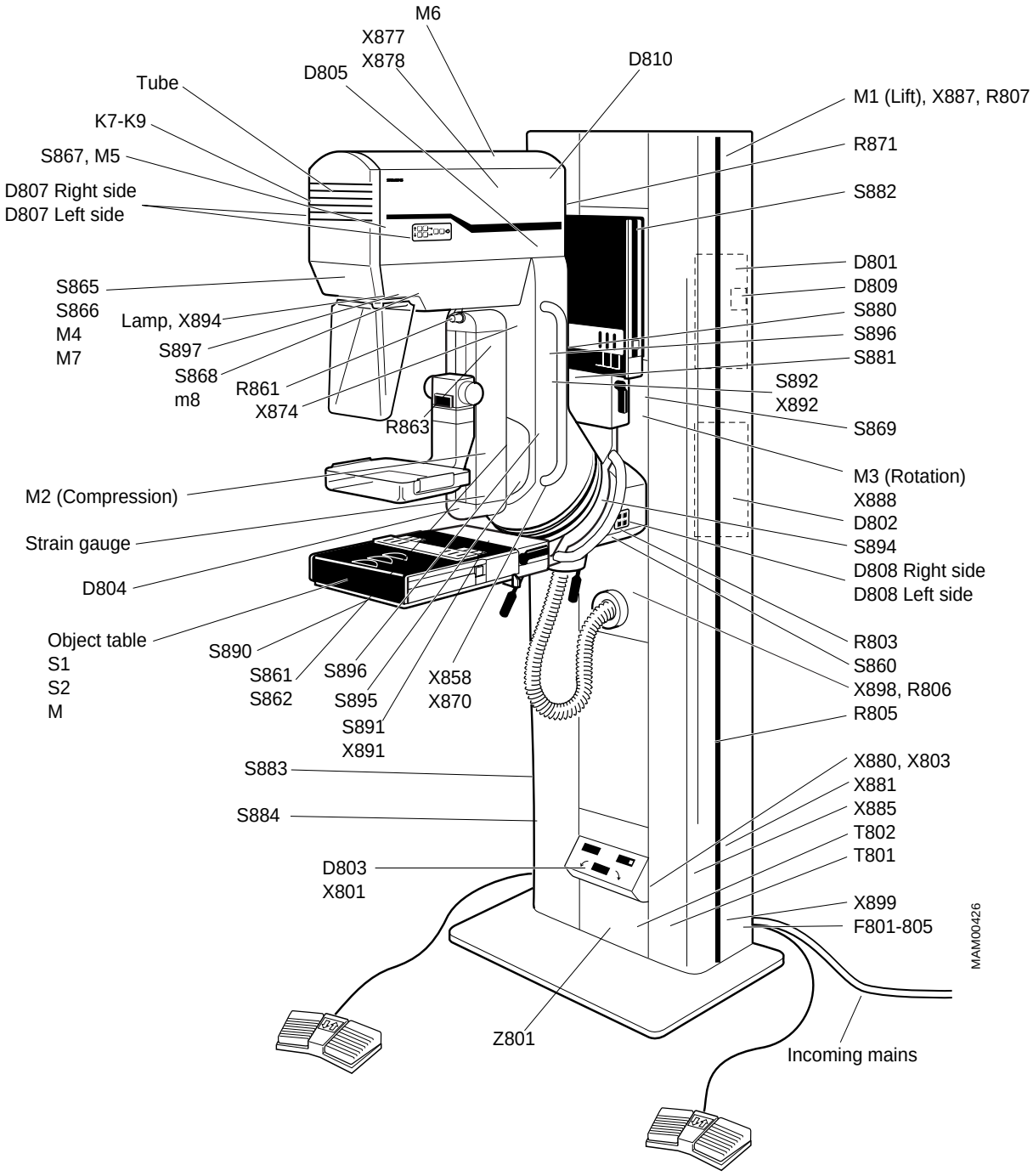


Fig. 8 Stand with pivoted object-table arm

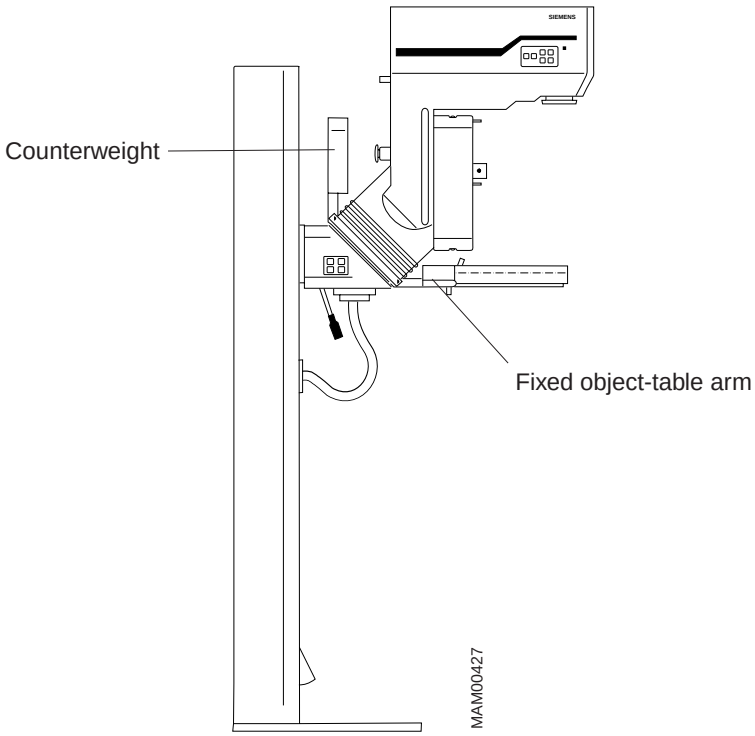


Fig. 9 Stand with fixed object-table arm

Pivoted object-table aram (“flying wing”) replaced by fixed object-table arm and counterweight

PCB Overview

D801	CPU BOARD
D802	MOTOR CONTROL BOARD
D803	DISPLAY BOARD
D804	FORCE AMPLIFIER BOARD
D805	WING BOARD
D807	BOARD FOR LIFT, ROTATION AND LAMP SWITCHES (NOT FITTED IN M1000)
D808	BOARD FOR LIFT AND ROTATION SWITCHES
D809	THICKNESS ADAPTER BOARD
D810	TILT SWITCH BOARD (Not fitted in M1000)

Option, remote control (MAMMOMAT 1000 only)

D811	REMOTE CONTROL TRANSMITTER (2 INCLUDED)
D812	REMOTE CONTROL RECEIVER (1 INCLUDED)
D833	REMOTE CONTROL DETECTOR (4 INCLUDED)

Fuses Overview

PCB	FUSE	FUSED VOLTAGE
D801	F1 2 AT	+5V, +5V_REF, +5V_DSP, +7V
D801	F2 1 AT	+5V_MPS
D802	F1 5 AT	+5V, +5V_M, +14V, D805/+5V
D802	F2 3.15 AT	+24VF, +15V
D802	F3 6.3 AT	+24V
D802	F5 5AT	17VAC (LAMP)
D802	F4 1 AT	24VACF (FAN)
Chassis-mounted fuses		
	F801 2 AT	11 VAC
	F802 1 AT	11 V_MPS
	F803 5 AT	14 VAC
	F804 5 AT	17 VAC
	F805 6.3 AT	24 VAC

NOTE! See spare parts list for replacement fuses.

Switches

Switch	Page	Description
S1/D801	3-6/1D	Reset switch for stand CPU.
S1/Object table	3-16/2A	Grid out switch located in the object table.
S1-1-4/D802	3-9/3D	Current limit switches: 1=+3%, 2=+6%, 3=+12%, 4=+24%.
S1-5/D802	3-9/3D	Tacho On/Off switch for rotation motor drive.
S1-S6/D807*	3-10/2A	Control switches for lamp, lift- and rotation movement. Left and right side.
S1-S6/D811****		Control swithces and transmitter for lamp, lift- and rotation movement. Left and right side. 2 provided.
S1-S4/D808	3-10/4B	Control switches for lift- and rotation movement. Left and right side.
S2/Object table	3-16/2A	Cassette inserted switch.
S860*	3-16/3C	Stereo lever switch*.
S861	3-12/2G	Compression limit switch, compression unit.
S862	3-12/2G	Decompression limit switch, compression unit.
S865**	3-15/2E	18 x 24 Collimator optoswitch**.
S866**	3-15/3E	24 x 30 Collimator optoswitch**.
S867**	3-15/4E	Filter position, optoswitch**.
S868**	3-15/5E	Focus position optoswitch**.
S869	3-8/3G	Tacho optoswitch
S880	3-4/2B	Emergency stop, switches off 24VAC and 14VAC, machine blocked.
S881	3-9/2G	Lift up limit switch, rotating unit.
S882	3-4/2A	Limit switch, distance tube head - floor <50 mm, switches off 24VAC, machine blocked.
S883	3-8/4B	Collision protection switch, risk of collision when tubehead is less than 120 mm from the floor.
S884	3-9/2G	Lift down limit switch, rotating unit.
S890*	3-16/3C	AEC in position switch (Wing 1)*.
S891*	3-16/3C	Object table locked in position (Wing1)*.
S892	3-16/2C	Object table locked in position (Wing 2)***.
S894*	3-16/3C	Select wing 1 switch*, ***.
S895*	3-16/3C	Select wing 2 switch*, ***.
S896*	3-13/5B	Tilt opto-switch. 0° or $\pm 10^0$ used with stereo option*.
S897	3-15/2G	Diaphragm switch.
S3	3-12/5F	Decompression button (**only** with separate control console).

* Not fitted in M1000
** Not fitted in M1000 with one filter
*** Not fitted in M3000 one wing
**** M1000 option, remote control

Potentiometers

Potentiometer	Page	Description
R803	3-13/2A	Tube angle, 2k.
R861	3-11/3E	Preset force, 10k.
R863	3-11/3E	Thickness, 2k.
R871	3-13/2A	Preset angle, 10k.

Motors

Motor	Page	Description
M	3-16/2A	Grid motor, placed in object table with grid.
M1	3-9/2G	Lift motor.
M2	3-12/2G	Compression motor.
M3	3-9/3G	Rotation motor.
M4*	3-15/3D	Collimator stepping motor*.
M5*	3-15/4D	Filter stepping motor*.
M6	3-7/4E	Fan, tube cooling.
M7*	3-14/4G	Mirror magnet*.
M8*	3-15/5D	Focus stepping motor*.
M9	3-9/5G	Rotation brake.
M10	3-9/5G	Rotation brake.

* Not fitted in M1000 with one filter

Miscellaneous

Misc.	Page	Description
COMP. UNIT	3-11, 3-12	Compression unit.
CABLE DUCT	3-2/3A	Generator to stand cable protection.
GROUND RAIL	3-2/1E	System grounding terminal.
K7	3-7/4E	Fan thermostat.
K8	3-7/4E	Tube overtemperature thermostat.
K9	3-7/4E	Tube housing overpressure switch.
L804 - L809	3-9/SG 3-12/2G	VHF choke (EMC)
LAMP	3-14/5G	Field light lamp.
R805	3-9/5G	Brake resistor, 6.2Ω.
R806	3-9/5G	Brake varistor
R807	3-9/2G	Lift motor varistor.
R860	3-11/2A	Strain gauge (R=300-400 Ω)
T801	3-3/2C	Mains transformer.
T802	3-3/3C	Insolation transformer
Z801	3-3/4C	Stereo mains filter, stand
C801 - C803	3-12/5G	EMC capacitors

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LIST OF SIGNALS AND TEST POINTS,STAND

Page	Signal Name	Origin	Via	Destination	Testpoint	LED
3-9/1C	ACT_SPEED	TACHO		D802	ACT_SPEED	
3-16/3C	AEC_POS	S890	D801	D801		
3-10/2A	ANGLE_MEM	A.M. -pot	D807	D801		
3-6/2B	AR	VH	D801	GENERATOR	D801 AR	
3-11/3B	BR_OPEN	D804			D804.X843 pin 8	V2
3-11/3B	BR_RET	D804			D804.X843 Pin 7	
3-9/4B	⁎BRAKE	D801		D802		
3-9/4E	⁎BRAKE_RET	D802		M9, M10	D802	
3-9/4E	⁎BRAKE_RELAY	D802		not used		
3-15/3C	C_LA	D805		M4		
3-15/3C	C_LB	D805		M4		
3-9/4E	C_LIM	D802				V11
3-15/3C	⁎C_PA1	D805		M4		
3-15/3C	⁎C_PA2	D805		M4		
3-15/3C	⁎C_PB1	D805		M4		
3-15/3C	⁎C_PB2	D805		M4		
3-12/2D	C_PWM	D802		M2	D802	
3-16/1A	CASS_LOADED	OBJ. TABLE	D805	D801		
3-16/2C	⁎COLL_DIR	D801		D805	D805 COLL_D	
3-16/2C	⁎COLL_STEP	D801		D805	D801, D805 COLL_ST	
3-16/3E	COLL_POS_18X24	18x24 switch	D805	D801	COLL_P1	
3-16/4E	COLL_POS_24X30	24x30 switch	D805	D801	COLL_P2	
3-12/1E	COMP_LIMIT	D802	D805	COMP. UNIT		
3-12/1B	⁎COMP_DIR	D801		D802	D802 COMP_D	
3-11/2F	COMP_FORCE	D804		D801	D804.X843 pin 5	
3-12/3E	COMP_OK	D802		D801		D802 V2 COMP_ERR
3-12/1E	COMP_PROT	D802		D801	D802	
3-12/1B	⁎COMP_SPEED	D801		D802	D801, D802 COMP_SP	
3-12/4F	COMPRESS	PEDAL	D805	D801, D802		
3-9/2D	D_PWM	D802			D802	
3-12/1E	DECOMP_ LIMIT	D802	D805	COMP. UNIT		
3-12/4F	DECOMPRESS	PEDAL / **		D801		
3-9/3B	⁎DIR	D801		D802	D802	
3-9/4F	DRIVE_OK	D802		D801		D802 V24DRIVE_ERR
3-9/1E	DRIVE_PROT	D802		D801	D802	
3-15/3D	FI_LA	D805		M5		
3-15/3D	FI_LB	D805		M5		
3-15/3D	⁎FI_PA1	D805		M5		

"⁎SIGNAL" = "SIGNAL" active low

**plus decompression button on separate control console.

Signal Name	Description
ACT_SPEED	Test point for frequency to voltage converted tacho signal.
AEC_POS	AEC-detector in position near breast.
ANGLE_MEM	Operator control signal for preset stop angle.
AR	Signal given to generator as exposure request. If grid used, grid has started.
BR_OPEN	Bridge open, compression force strain gauge not working correctly.
BR_RET	Compression force strain guage return line (appr. 0V)
*BRAKE	Control signal to brake reversing relay.
*BRAKE_RET	Output to the brakes for max or min braking when active.
⁎BRAKE RELAY	Output to brake reversing relay, max brake if ⁎BRAKE_RET active.
C_LA	Output line A. Collimator stepping motor M4
C_LB	Output line B. Collimator stepping motor M4
C_LIM	Rotation and fast-acting current limit
⁎C_PA1	Output Phase A1. Collimator stepping motor M4
⁎C_PA2	Output Phase A2. Collimator stepping motor M4
⁎C_PB1	Output Phase B1. Collimator stepping motor M4
⁎C_PB2	Output Phase B2. Collimator stepping motor M4
C_PWM	Pulse Width Modulated power output to compression motor.
CASS_LOADED	Cassette inserted in object table.
⁎COLL_DIR	Direction Control signal . For the filter stepping motor.
⁎COLL_STEP	Step control signal for the collimator stepping motor.
COLL_POS_18X24	Signal from the 18 x 24 collimator optoswitch
COLL_POS_24X30	Signal from the 24 x 30 collimator optoswitch
COMP	Power output via compression limit switch to compression motor.
⁎COMP_DIR	Controls compression motor to compress (moving down)
COMP_FORCE	Analog signal indicating compression force.
COMP_OK	Compression motor working correctly, no over current.
COMP_PROT	Compression relay K4 is working correctly, checked 1s after pedal release.
⁎COMP_SPEED	Pulse Width Modulated signal to control speed of compression motor (20kHz).
COMPRESS	Operator control signal to move compression plate down.
D_PWM	Pulse Width Modulated power output to rotation or lift motor.
DECOMP	Power output via decompression limit switch to compression motor.
DECOMPRESS	Operator control signal to move compression plate up.
⁎DIR	Selecting direction of rotation or lift motor.
DRIVE_OK	Rotation and lift motor are working correctly, no over current, approx. 1.5 s delay.
DRIVE_PROT	DMG relay K6 is working correctly, checked 3s after rot/lift button is released.
FI_LA	Output line A. Filter stepping motor M5
FI_LB	Output line B. Filter stepping motor M5
⁎FI_PA1	Output phase A1. Filter stepping motor M5

Page	Signal Name	Origin	Via	Destination	Testpoint	LED
3-15/4C	⁎FI_PA2	D805		M5		
3-15/4C	⁎FI_PB1	D805		M5		
3-15/4C	⁎FI_PB2	D805		M5		
3-15/2C	⁎FILTER_DIR	D801		D805	D805 FILT_D	
3-15/2B	FILTER_POS	Filter switch	D805	D801	FILT_P	
3-15/2C	⁎FILTER_STEP	D801		D805	D805 FILT_ST	
3-15/5C	FO_LA	D805		M8		
3-15/5C	FO_LB	D805		M8		
3-15/5C	⁎FO_PA1	D805		M8		
3-15/5C	⁎FO_PA2	D805		M8		
3-15/5C	⁎FO_PB1	D805		M8		
3-15/5C	⁎FO_PB2	D805		M8		
3-15/1C	⁎FOCUS_DIR	D801		D805	D805 FOCUS_D	
3-15/1B	FOCUS_POS	Focus switch	D805	D801	FOCUS_P	
3-15/1C	⁎FOCUS_STEP	D801		D805	D805 FOCUS_DT	
3-16/3B	GRID_MOTOR_N	D802	D805	OBJ. TABLE	D802 GRID_M	
3-16/2A	GRID_OUT	OBJ. TABLE	D805	D801	D801 GRID_O	
3-16/2G	⁎GRID_SPEED	D801		D802	D801 GRID_SP	
3-11/3D	I1_OUT	D804			D804.X843 pin 6	
3-6/2B	⁎KVA	D801,D701 D702, D705		D700 (GENERATOR)	D801 (D705, X715)	
3-14/5G	LAMP	D807, D812**	D805	D801		
3-14/4C	⁎LAMP_CTRL	D801		D802		
3-14/5F	LAMP_V	D802		LAMP	D802 LAMP	
3-8/3D	LED	D802		TACHO switch		
3-15/2E	LED_1	D805		18 x 24 switch		
3-15/3E	LED_2	D805		24 x 30 switch		
3-15/4E	LED_3	D805		Filter switch		
3-15/5E	LED_4	D805		Focus switch		
3-10/2A	LIFT_DOWN	D807, D808, D812**	D805	D801, D802		
3-10/2A	LIFT_UP	D807, D808, D812**	D805	D801, D802		
3-14/4F	⁎MIRROR_MAGNET	D802		M7	D802 MIRROR	
3-6/3B	MPS	D801		GENERATOR	D801	
3-7/4C	OKT1_	TUBE/K8		GENERATOR		
3-7/4C	OKT2_	TUBE/K9		GENERATOR		
3-9/2C	PGM_SPEED	D802			PGM_SPEED	
3-13/2D	POT_RETURN	POT		D801		
3-11/2E	PRES_FORCE	R861		D801		
3-13/1A	PRESET_ANGLE	R871	D805	D801		

"⁎SIGNAL" = "SIGNAL" active low

** M1000 option, remote control, D807 not fitted

Signal Name	Description
⁎FI_PA2	Output phase A2. Filter stepping motor M5
⁎FI_PB1	Output phase B1. Filter stepping motor M5
⁎FI_PB2	Output phase B2. Filter stepping motor M5
⁎FILTER_DIR	Control signal . For the filter stepping motor.
FILTER_POS	Signal from the filter pos collimator optoswitch
⁎FILTER_STEP	Step control. For the filter stepping motor.
FO_LA	Output line A. Focus stepping motor M8
FO_LB	Output line B. Focus stepping motor M8
⁎FO_PA1	Output Phase A1. Focus stepping motor M8
⁎FO_PA2	Output Phase A2. Focus stepping motor M8
⁎FO_PB1	Output Phase B1. Focus stepping motor M8
⁎FO_PB2	Output Phase B2. Focus stepping motor M8
⁎FOCUS_DIR	Control signal for the focus stepping motor.
FOCUS_POS	Signal from the focus pos collimator optoswitch.
⁎FOCUS_STEP	Step control signal for the focus stepping motor.
GRID_MOTOR_N	Grid motor return line.
GRID_OUT	Active when the grid is not in end position.
⁎GRID_SPEED	Pulse Width Modulated signal control speed of grid motor.
I1_OUT	Output signal from compression force preamplifier.
⁎KVA	Signal to terminate exposure. WIRED-OR line, see generator.
LAMP	Operator control signal for the field light lamp.
⁎LAMP_CTRL	Signal to switch on the field light lamp.
LAMP_V	Output to the field light lamp.
LED	Output to the LED in the tacho opto switch in the rotation motor.
LED_1	Output to the LED in the 18 x 24 collimator opto switch.
LED_2	Output to the LED in the 24 x 30 collimator opto switch.
LED_3	Output to the LED in the filter collimator opto switch.
LED_4	Output to the LED in the focus collimator opto switch.
LIFT_DOWN	Operator control signal to move compression plate down.
LIFT_UP	Operator control signal to move compression plate up.
⁎MIRROR_MAGNET	Output to mirror magnet. Enabled via ⁎LAMP_CTRL.
MPS	Multi processor serial communication for information exchange Master - Slaves.
OKT1_	Signal from temperature switch K8 on the tube.
OKT2_	Signal from the over pressure switch K9 on the tube.
PGM_SPEED	Test point for duty cycle to voltage converted programmed speed signal.
POT_RETURN	Return line for potentiometers connected to 0VA via a 20Ω resistor.
PRES_FORCE	Analog signal as preset value for maximum compression force.
PRESET_ANGLE	Analog signal as preset value for requested rotation angle.

LIST OF VOLTAGES AND TEST POINTS, STAND

Page	Signal Name	Origin	Via	Destination	Testpoint	LED
3-12/2D	PU	D802			PU	
3-9/4B	⁎RELEASE	D801		D802	D802	
3-6/1E	⁎RESET	D801				
3-6/1E	⁎RESET_HW	D801				
3-6/1E	RESET_SW	D801				
3-10/3A	ROT_CW	D807, D808, D812***	D805	D801, D802		
3-10/3A	ROT_CCW	D807, D808, D812***	D805	D801, D802		
3-13/4A	ROT_POS**	D806**		D801		
3-6/3D	RXD	GEN.		D801	D801	
3-9/3B	⁎SEL_ROT	D801		D802	D802 SEL_ROT	
3-16/3C	SELECT_WING1	S891		D801		
3-16/4C	SELECT_WING2	S892		D801		
3-9/2B	⁎SPEED	D801		D802	D801, D802 SPEED	
3-15/2C	⁎STEP_ENABLE	D801		D805	D805 STEP_EN	
3-15/1B	STEREO_COLL	S897		D801		
3-16	STEREO_LEVER	S860	D805	D801		
3-14/1B	TABLE_CONFIG	OBJ.TABLE	D805	D801		
3-8/3G	TACHO	Tacho switch		D802	D802 TACHO	
3-11/3E	THICKNESS	R863		D801		
3-11/5E	THICKNESS_B	THICKNESS	D809			
3-11/5F	THICKNESS_STE-REO	D809		X885		
3-13/5B	TILT	S896/D810	D805	D801		D810 V8
3-13/2A	TUBE_ANGLE	R803		D801		
3-6/4D	TXD	D801		GENERATOR	D801 TXD	
3-6/3B	VH	GEN.		D801		
3-11/3C	ZERO	D804			D804.X843 pin 4	

“*SIGNAL” = “SIGNAL” active low.

** Not used with software v2.1 or higher.

*** M1000 option, remote control, D807 not fitted

Signal Name	Description
PU	Pull up signal for error comparators = +15V, +5V, +24V voltages OK.
⁎RELEASE	Control signal to release the brakes from min or max to permanent magnet braking.
RESET	Reset signal to the CPU.
RESET_HW	Reset signal from the CPU to the reset cicuit, caused by slave restart and CPU watchdog reset.
RESET_SW	Signal from the reset switch to the CPU via the reset circuit.
ROT_CW	Operator control signal to rotate the x-ray system clockwise.
ROT_CCW	Operator control signal to rotate the x-ray system counter clockwise.
ROT_POS	Low level signal pulse indicating +10 or -10 degrees of rotation.
RXD	Input for receiving data via MPS.
⁎SEL_ROT	Low level signal selects the rotation drive to be controlled.
SELECT_WING1	Signal from select wing 1 switch. Wing 1 selected.
SELECT_WING2	Signal from select wing 2 switch. Wing 2 selected.
⁎SPEED	Pulse Width Modulated signal to control speed of rotation or lift motor (20 kHz).
⁎STEP_ENABLE	Control signal to enable all stepping motors.
STEREO_COLL	External diaphragm switch, diaphragm in place. For stereo or spot diaphragm, 18 x 24 collimator in M1000 with one filter.
STEREO_LEVER	Signal from stereo lever switch, indicating lever not in stereo position.
TABLE_CONFIG	4 inputs from object table, see table configuration .
TACHO	Signal from rotation motor tachometer.
THICKNESS	Analog signal indicating the compression thickness.
THICKNESS_B	Buffered output to the thickness adapter board D809 (Stereo option)
THICKNESS_STE-REO	Isolated analog signal indicating compression thickness for stereo evaluation unit.
TILT	Indicates that the stereo angle is 0° or ±10°. Visible through vent opening behind tube.
TUBE ANGLE	Analog signal indicating the rotation angle.
TXD	Output for sending data via MPS.
VH	The stand is informed that the generator has completed its preparation.
ZERO	Used for adjusting offset of the compression force amplifiers.

LIST OF VOLTAGES AND TEST POINTS, STAND

Page	Voltage	Origin	Supplied from	Supply for	Test	LED	Fuse
3-3/4E	+5V	D801	11V	Digital IC, +5V_REF	5V	V7	D801/F1 F801
3-3/4E 3-11/3B	+5V_REF	D801	+5V	Pots. D804	5V_REF X843 pin 2		D801/F1 F801
3-3/3E	+5V_DSP	D801	11V	D803, Display	5V_DSP	V6	D801/F1 F801
3-3/2E 3-10/3B	+7V	D801	11V	Analog IC, D804	7V X843 pin1	V5	D801/F1 F801
3-3/3E	+5V_MPS	D801	11V_MPS	Generator interface	5V_MPS	V26	D801/F2 F802
3-3/3D	0VD	GND	D801/X811	Digital IC	0VD1,OVD2		
3-3/3D 3-10/3B	0VA	0VD	D801	Analog IC D804	0VA1 X843 pin 3		
3-6/5D	0V_MPS	D700/GND		Generator interface ground	D801 MPS		
3-3/2C	11V	T801	230VAC	+5V, +5V_DSP, +7V			D801/F1 F801
3-6/5B	11V_MPS	T801	230VAC	+5V_MPS			D801/F2 F802
3-4/3D	+5V	D802	14VAC	Digital IC	5V	V57	D802/F1 F803
3-4/4E	+5V_M	D802	+5V	D801-D802 opto interface		V57	D802/F1 F803
3-2/5C	0V_W	D801	D805/X856	Optointerface			
3-2/4C	0V_M	D801	D802/X822	Optointerface			
3-4/3D	+14V	D802	14VAC	+5V, D805	14V		D802/F1 F803
3-4/2D	+15V	D802	+24VF	Transistor drivers M1,M3	15V	V16	D802/F2
3-4/2C	+24V	D802	24VAC	+15V			D802/F3 F805
3-4/2D	+24VF	D802	+24V	Switches, relays, etc	24VF		D802/F2
3-4/3A	14VAC	T801	230VAC	+14V			D802/F1 F803
3-14/5B	17VAC	T801	230VAC	LAMP	17VACF		D802/F5 F804
3-14/4E	17VACF	D802	17VAC	LAMP	17VAC_RET		D802/F5 F804
3-14/4D	0V_L	D802	D802	Lamp control			
3-14/5D	-V_L	D802	17VACF	Lamp control			
3-4/2A	24VAC	T801	230VAC				D802/F3 F805
3-4/2E	24VACF	D802	24VAC	Fan			D802/F4
3-4/3B	0V	GND	D802/X821	Ground	0V, 0V1		
3-4/2F	+5V	D805	D802/+14V	Digital IC	5V	V17	D802/F1 F803
3-4/2G	+5V_R	D805	+5V	User switches			D802/F1 F803

Voltage	Description (typical value)
+5V	Regulated DC voltage, 4.75V < +5V < 5.25V
+5V_REF	DC voltage, +5V -5% < +5V_REF < +5V
+5V_DSP	Regulated DC voltage, 4.75V < +5V_DSP < 5.25V
+7V	Regulated DC voltage, 6.60V<+7V<7.25V
+5V_MPS	Regulated DC voltage, 4.75V < +5V_MPS < 5.25V
0VD	Digital ground
0VA	Analog ground
0V_MPS	Generator interface ground. Floating, grounded by generator.
11V	AC supply voltage, 11VAC 1) 2)
11V_MPS	AC supply voltage, 11VAC 1) 2)
+5V	Regulated DC voltage, 4.75V < +5V < 5.25V
+5V_M	Regulated DC voltage, 4.75V < +5V_M < 5.25V for optointerface D801-D805
0V_W	Digital ground optointerface D801 - D805
0V_M	Digital ground optointerface D801 - D802
+14V	Unregulated DC voltage, 18V 1)
+15V	Regulated DC voltage, 14.25V < +15V < 15.75V
+24V	Unregulated DC voltage, 32V 1)
+24VF	Unregulated DC voltage, 32V 1)
14VAC	AC supply voltage, 14 VAC 1) 2)
17VAC	AC supply voltage, 17 VAC 1) 2)
17VACF	AC supply for lamp 1)2)
0V_L	Floating ground for LAMP voltage regulation 1)2)
-V_L	Unregulated supply voltage for lamp control circuit 1)2)
24VAC	AC supply voltage, 24VAC 1) 2)
24VACF	AC supply voltage for the fan 1) 2)
0V	Circuit ground
+5V	Regulated DC voltage, 4.75V < +5V < 5.25V
+5V_R	Regulated DC voltage, 4.40V < +5V_R < 5.25V

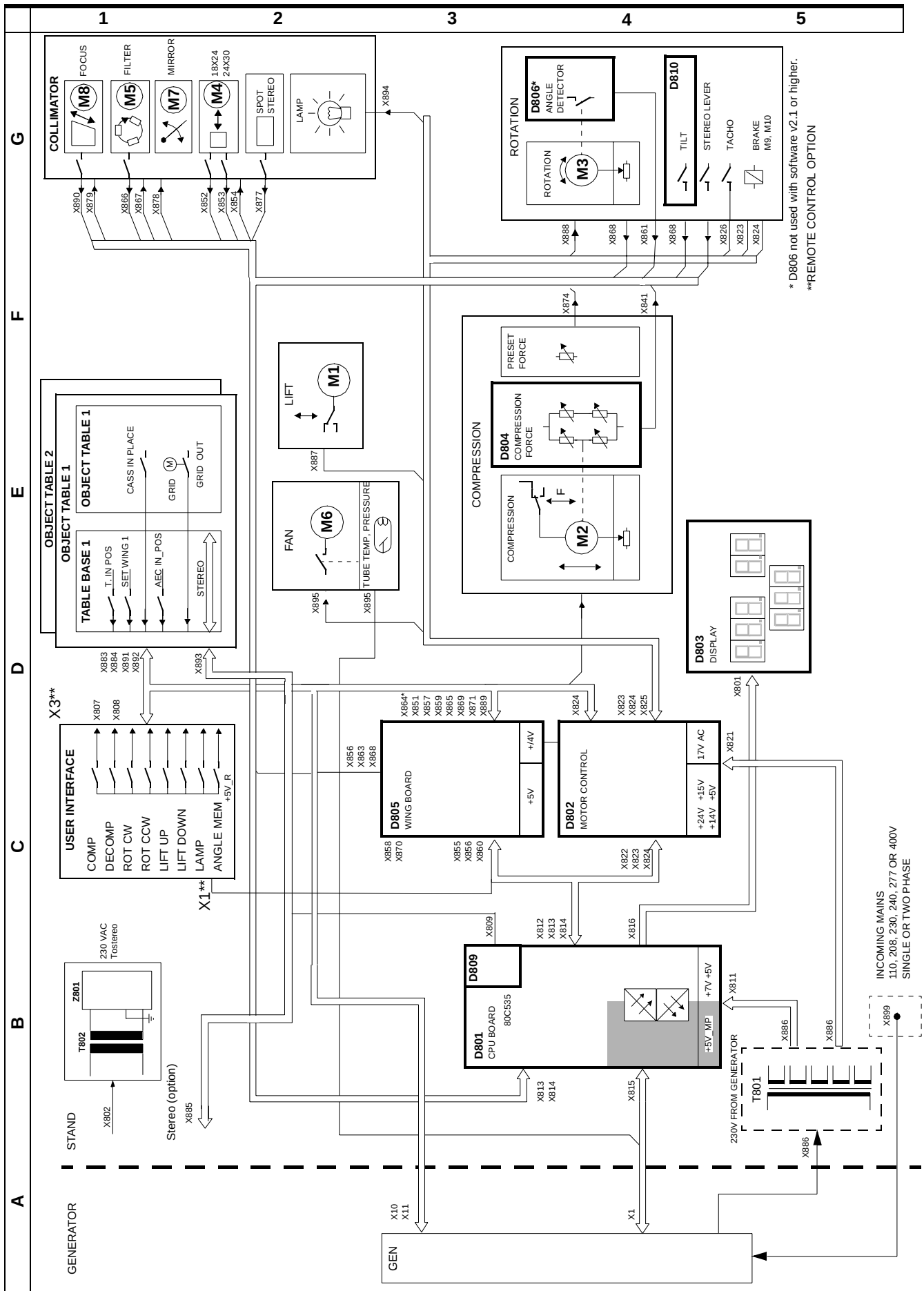
LIST OF VOLTAGES AND TEST POINTS, STAND

Page	Voltage	Origin	Supplied from	Supply for	Test	LED	Fuse
3-3/2B	230VAC	Generator	D711/X14	Stand	X881/2,3		
3-3/1C	P.E. ⏚	Stand X899	Inc. mains voltage	Whole system	X899/PE		
3-3/1C	N	Stand X899	Inc. mains voltage	Whole system	X899/N		
3-3/1C	L1	Stand X899	Inc. mains voltage	Whole system	X899/L1		
3-3/1C	L2	Stand X899	Inc. mains voltage	Whole system	X899/L2		
3-3/1C	L3	Stand X899	Not used		X899/L3		

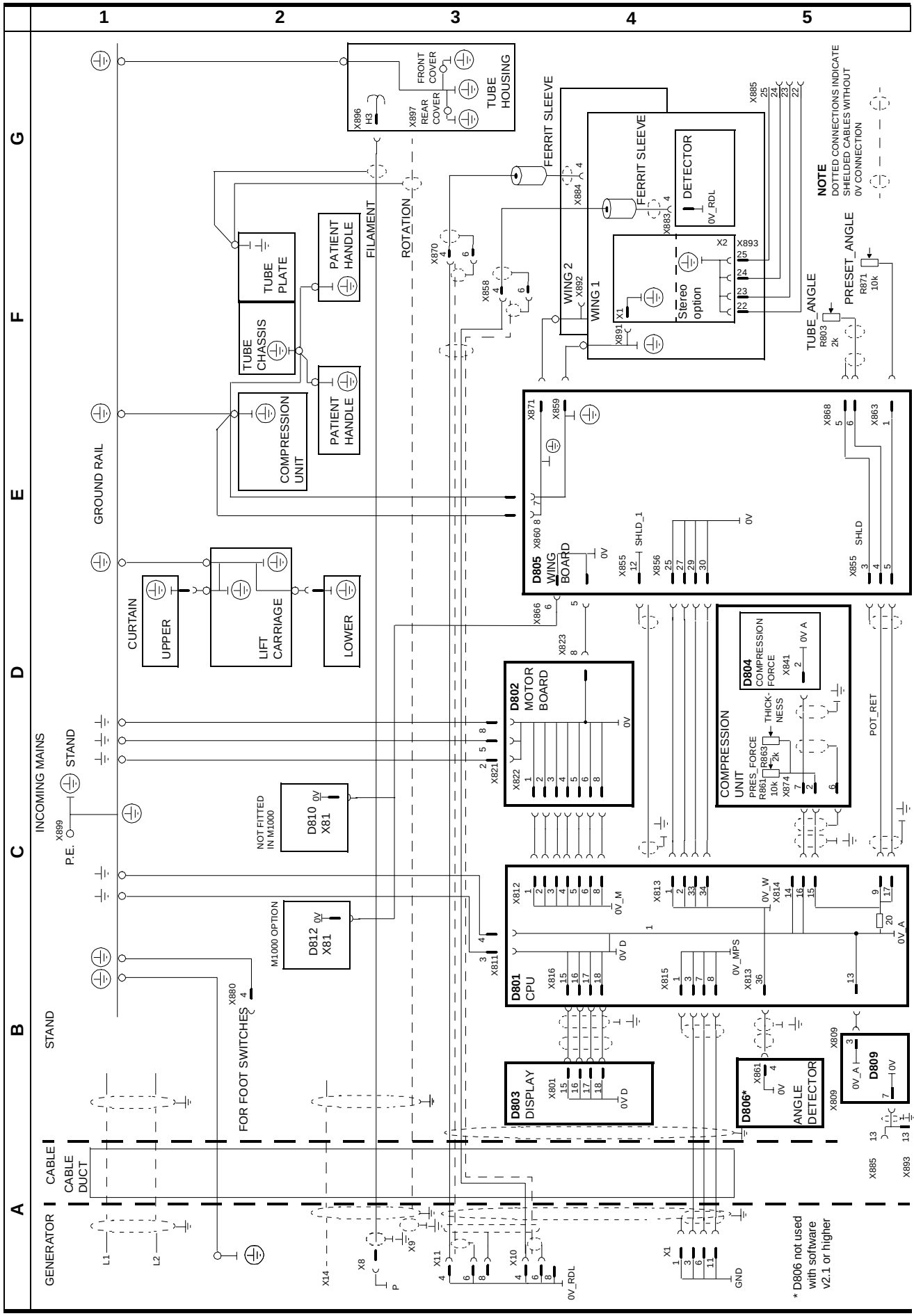
[1] STANDBY TYPICAL VALUE, 230VAC INPUT
[2] Floating voltage. Measure with digital multimeter or differential amplifier.

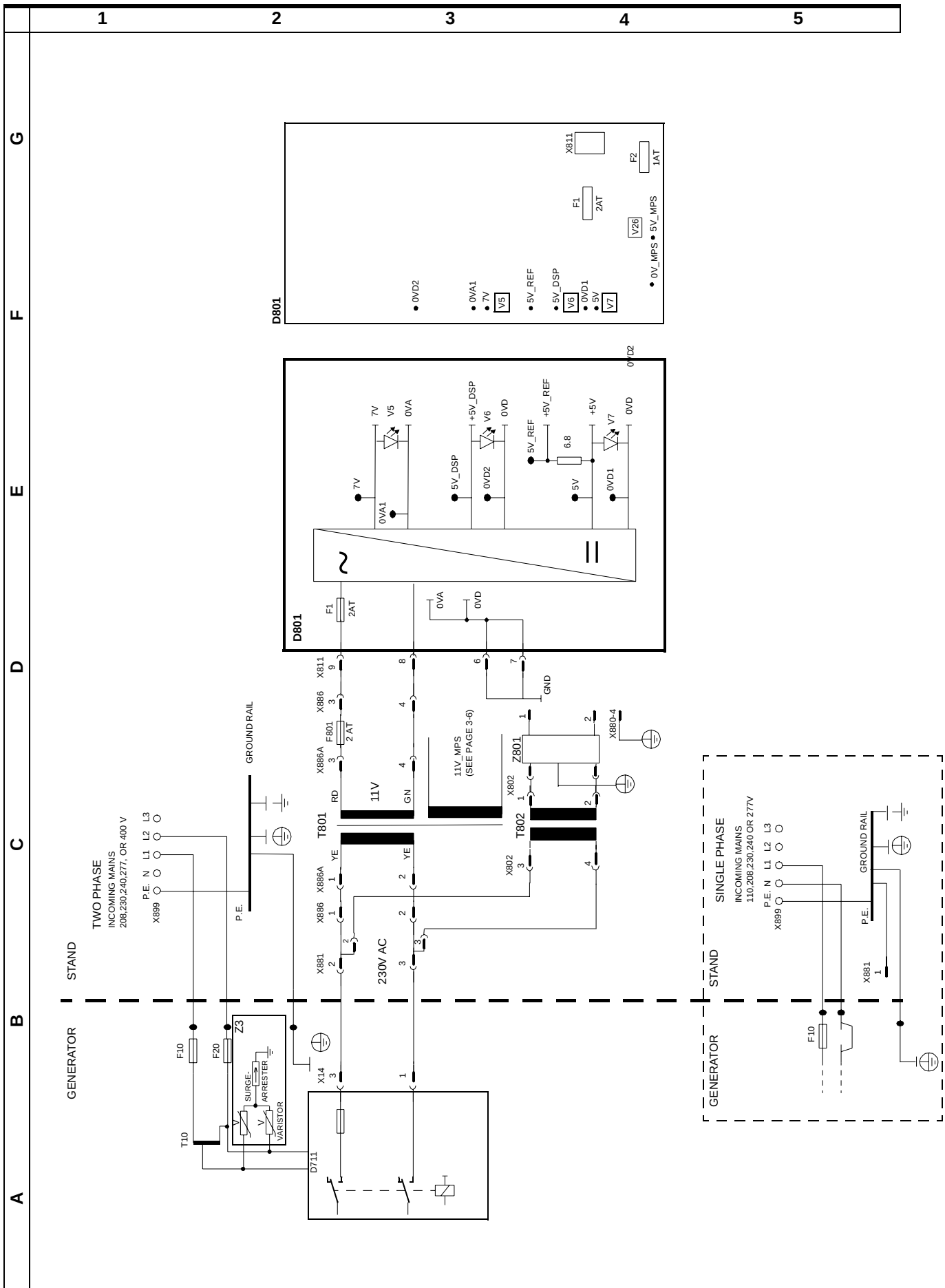
Voltage	Description (typical value)
230VAC	Stand mains voltage input, 207VAC < 230VAC < 253VAC
P.E. ⏚	Protective earth terminal, incoming mains
N	Neutral line terminal, incoming mains
L1	Line 1 terminal, incoming mains voltage
L2	Line 2 terminal, incoming mains voltage
L3	Not used

BLOCK DIAGRAM CABLE CONNECTIONS

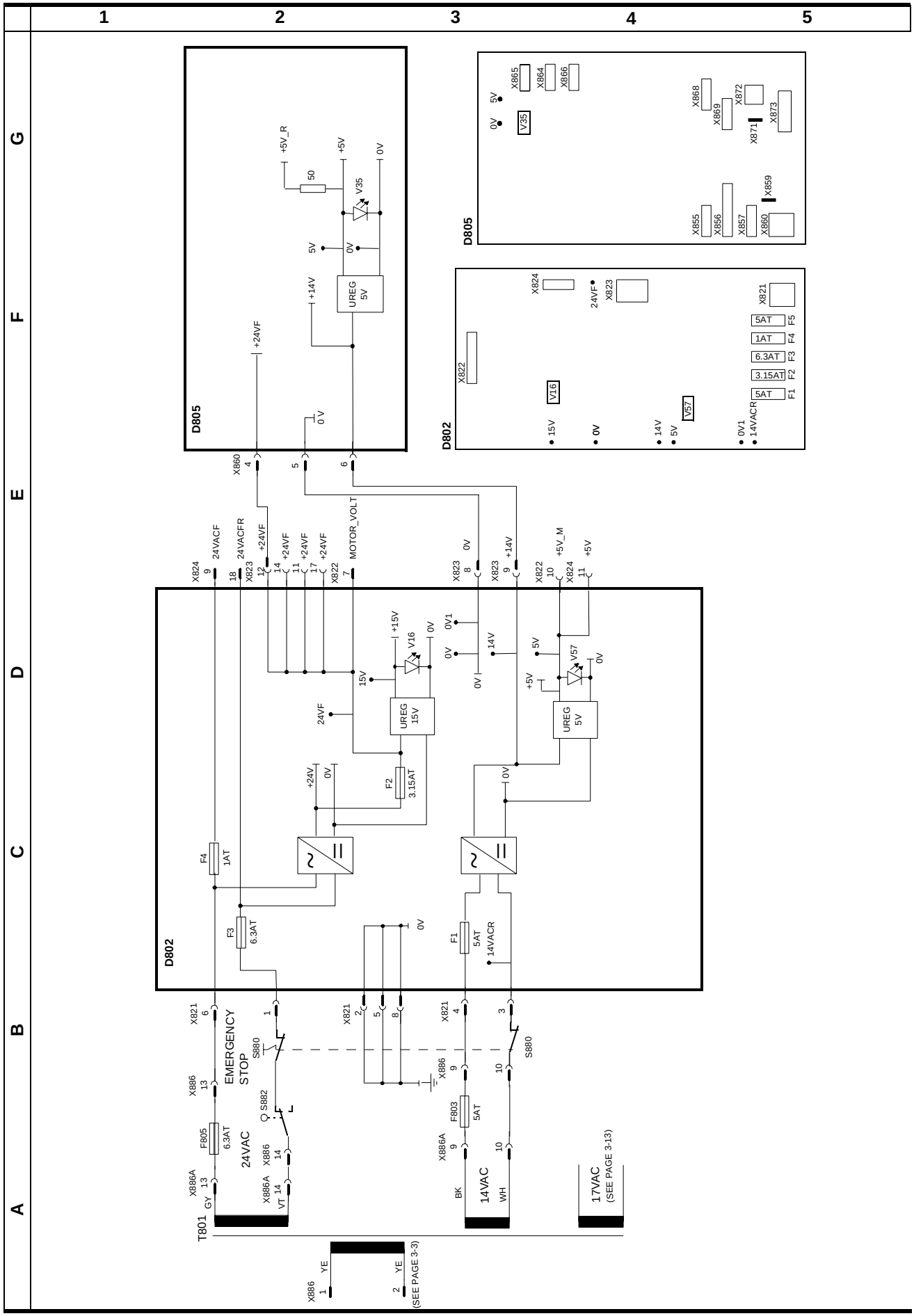


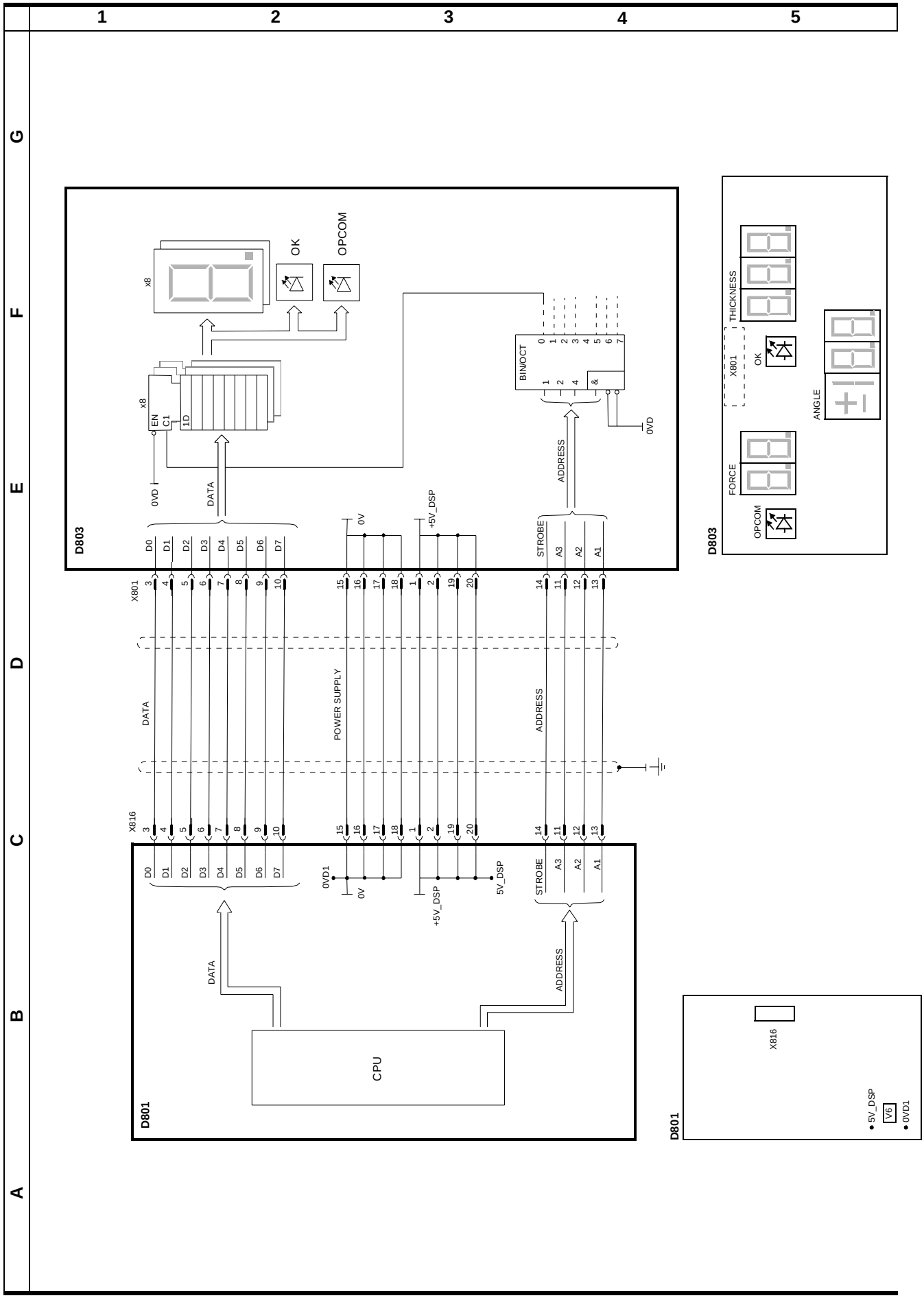
GROUNDING CONNECTIONS



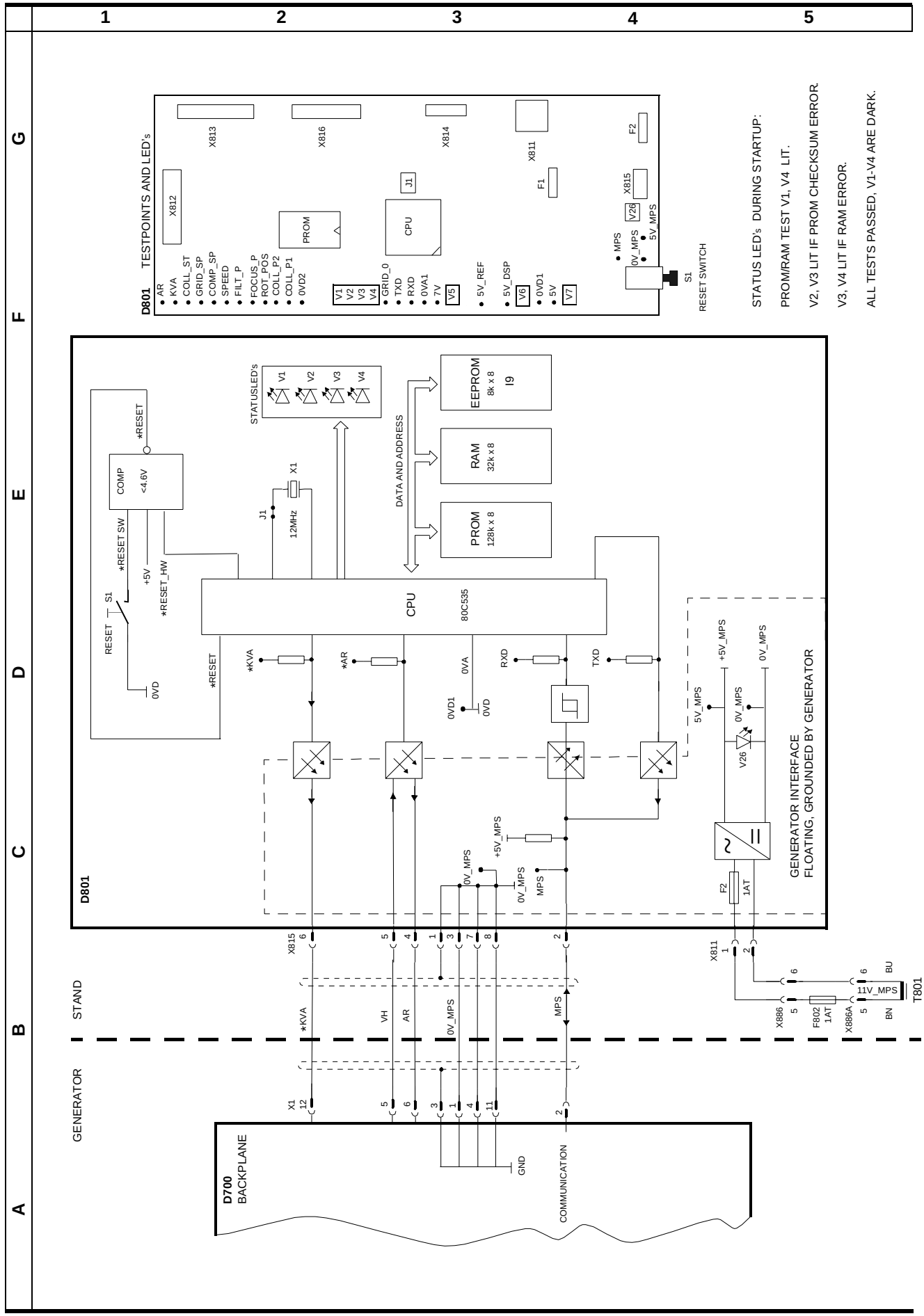

1
2
3
4
5
A
B
C
D
E
F
G
D801
0VD2
0VA1
7V
V5
5V_REF
5V_DSP
V6
0VD1
5V
V7
0V_MPS
5V_MPS
V26
F1
2AT
F2
1AT
X811
+5V_DSP
+5V_REF
+5V
0VD
6.8
0VA
GND
F801
2 AT
X886
X886A
X811
11V
11V_MPS
(SEE PAGE 3-6)
T801
T802
Z801
X802
X880-4
RD
GN
YE
GROUND RAIL
P.E.
TWO PHASE
INCOMING MAINS
208,230,240,277, OR 400 V
P.E. N L1 L2 L3
X899
230V AC
X881
X14
STAND
GENERATOR
F10
F20
Z3
SURGE-
ARRESTER
VARISTOR
T10
D711
SINGLE PHASE
INCOMING MAINS
110,208,230,240 OR 277V

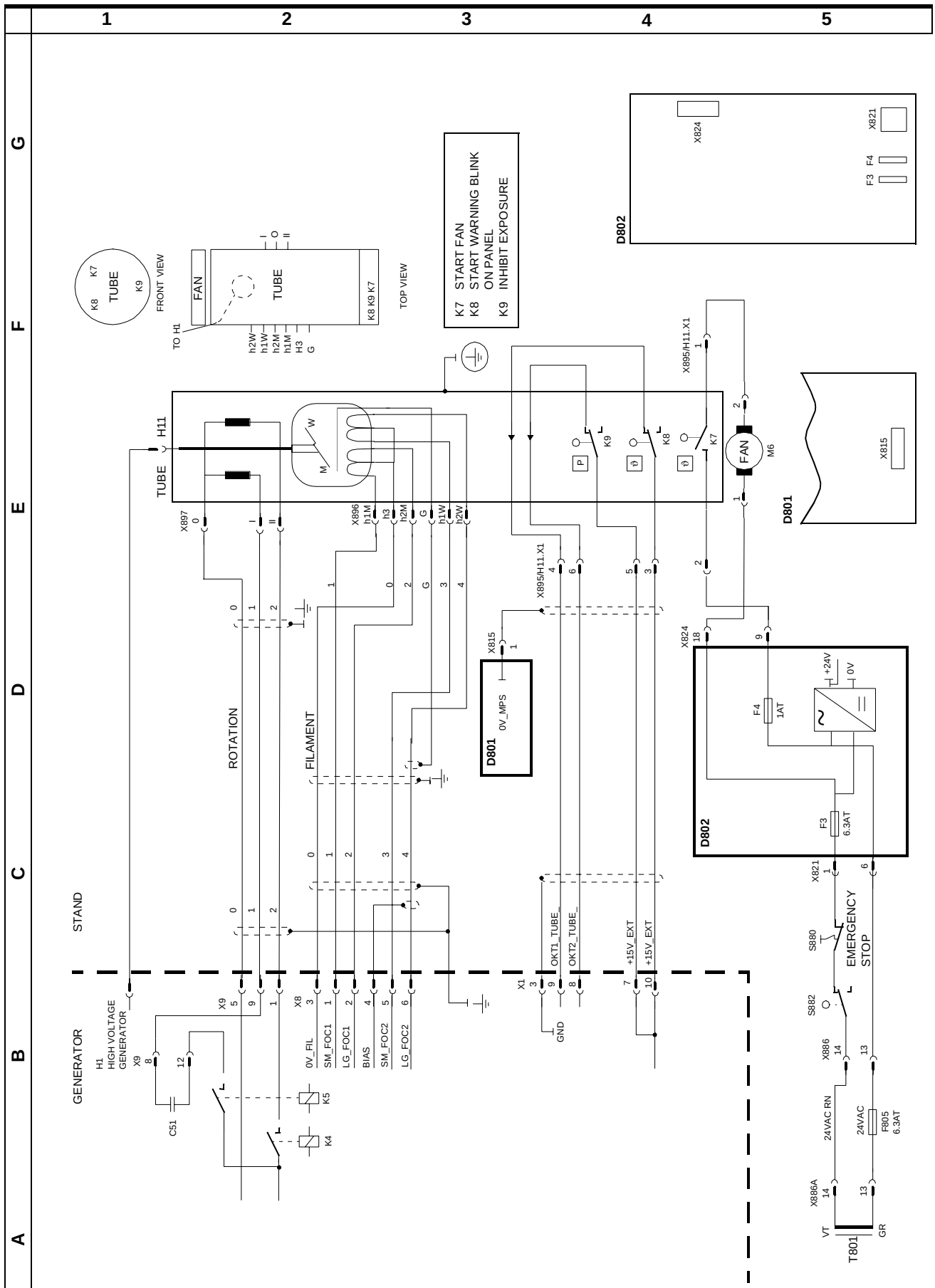
POWER SUPPLY MOTOR CONTROL



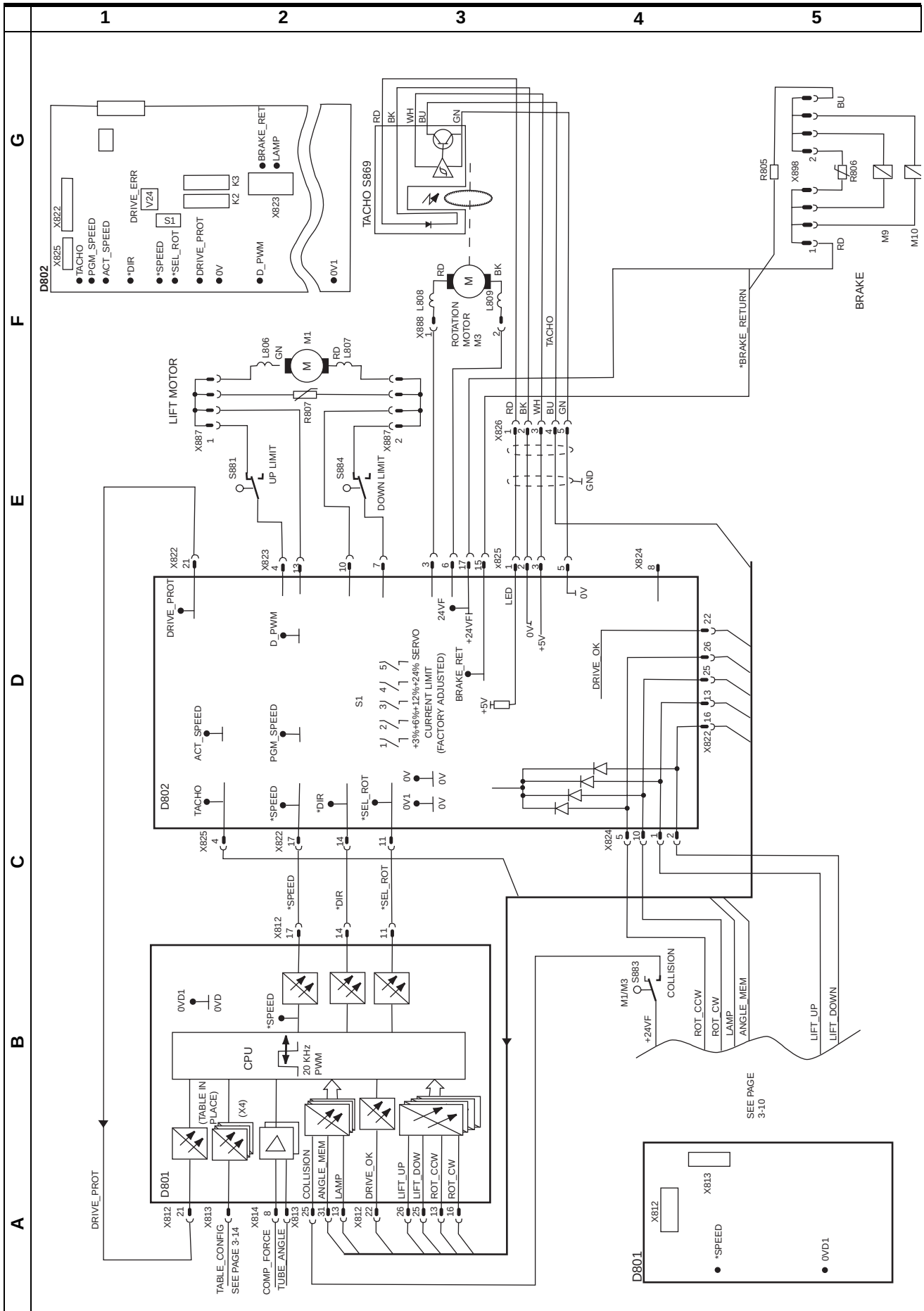

1
2
3
4
5
A
B
C
D
E
F
G
D803
x8
OK
OPCOM
EN
C1
1D
0VD
DATA
BIN/OCT
ADDRESS
D0
D1
D2
D3
D4
D5
D6
D7
0V
+5V_DSP
STROBE
A3
A2
A1
X801
X816
POWER SUPPLY
0VD1
5V_DSP
D801
CPU
THICKNESS
FORCE
ANGLE
+1.8
V6

CPU BOARD INTERNAL, GENERATOR INTERFACE

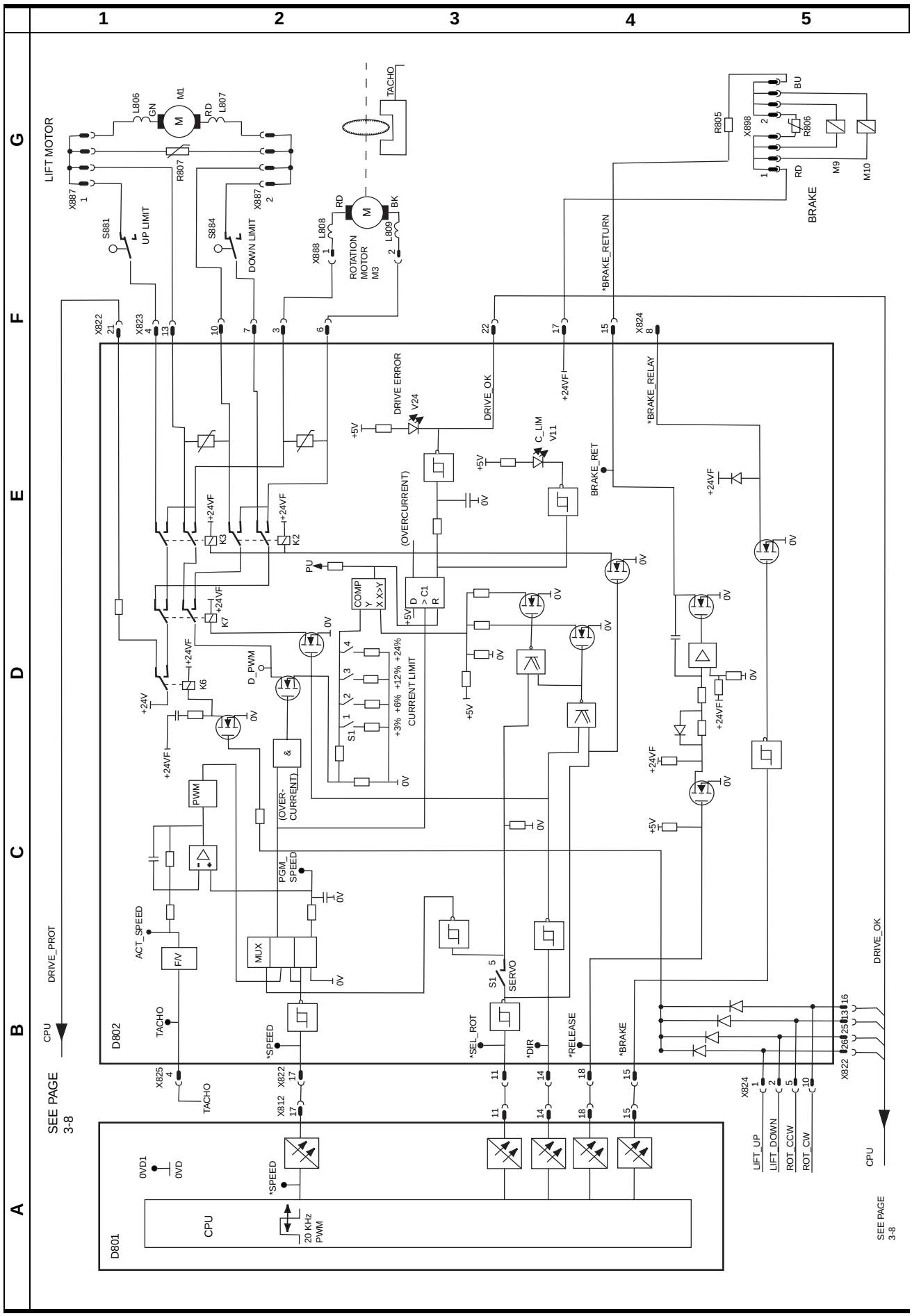



1
2
3
4
5
A
B
C
D
E
F
G
K7 START FAN
K8 START WARNING BLINK ON PANEL
K9 INHIBIT EXPOSURE
FRONT VIEW
TOP VIEW
TUBE
FAN
TO H1
h2W
h1W
h2M
h1M
H3
G
D802
X824
X821
F3 F4
H11
TUBE
M
W
X895/H11.X1
X896
X897
ROTATION
FILAMENT
STAND
GENERATOR
H1
HIGH VOLTAGE GENERATOR
X9
X8
C51
K5
K4
0V_FIL
SM_FOC1
LG_FOC1
BIAS
SM_FOC2
LG_FOC2
X815
D801
0V_MPS
OKT1_TUBE_
OKT2_TUBE_
+15V_EXT
GND
K9
K8
K7
FAN
M6
D801
X815
F4
1AT
+24V
0V
F3
6.3AT
X821
S880
S882
EMERGENCY STOP
X886
24VAC RN
24VAC
F805
6.3AT
X886A
VT
GR
T801

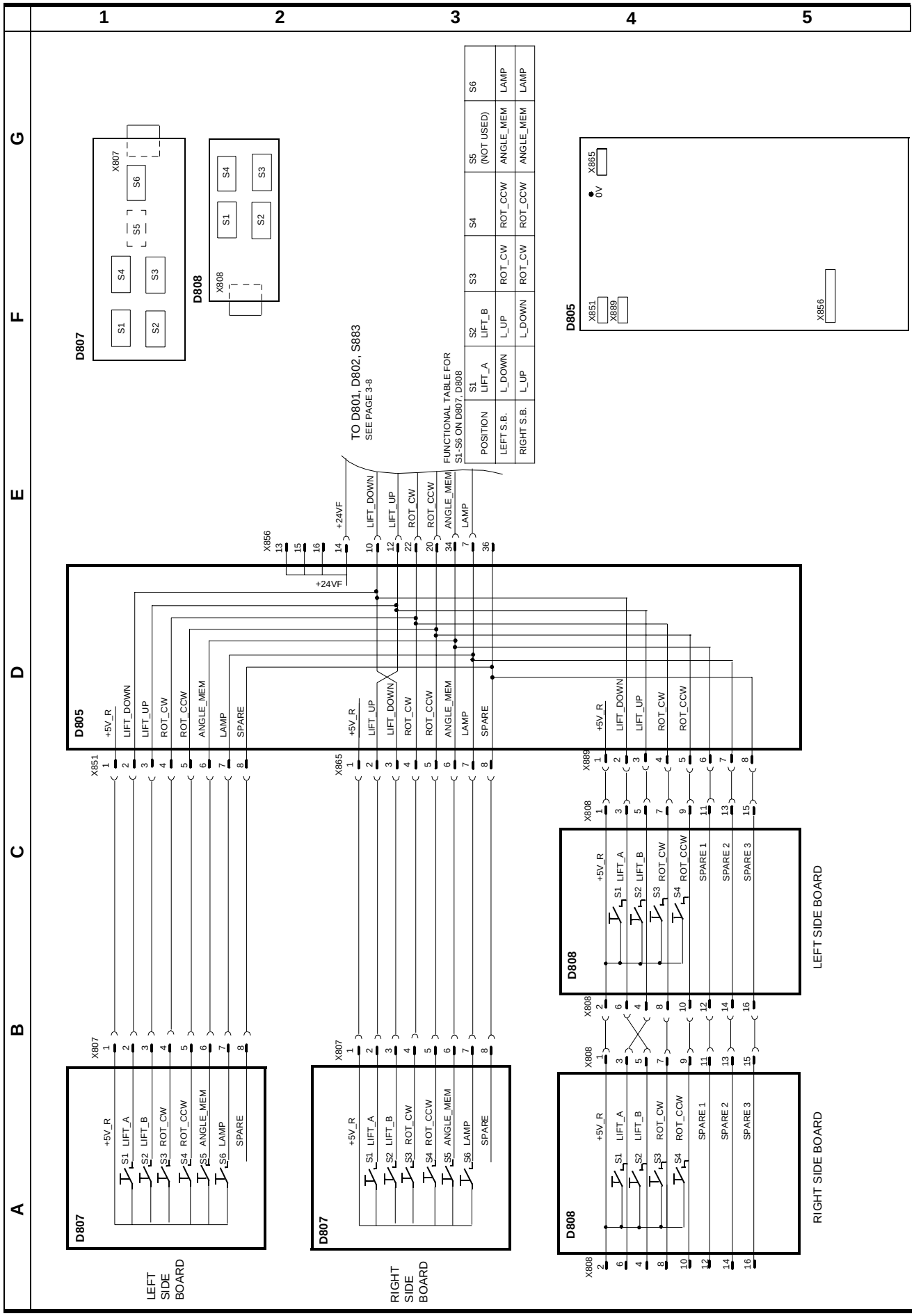
LIFT AND ROTATION



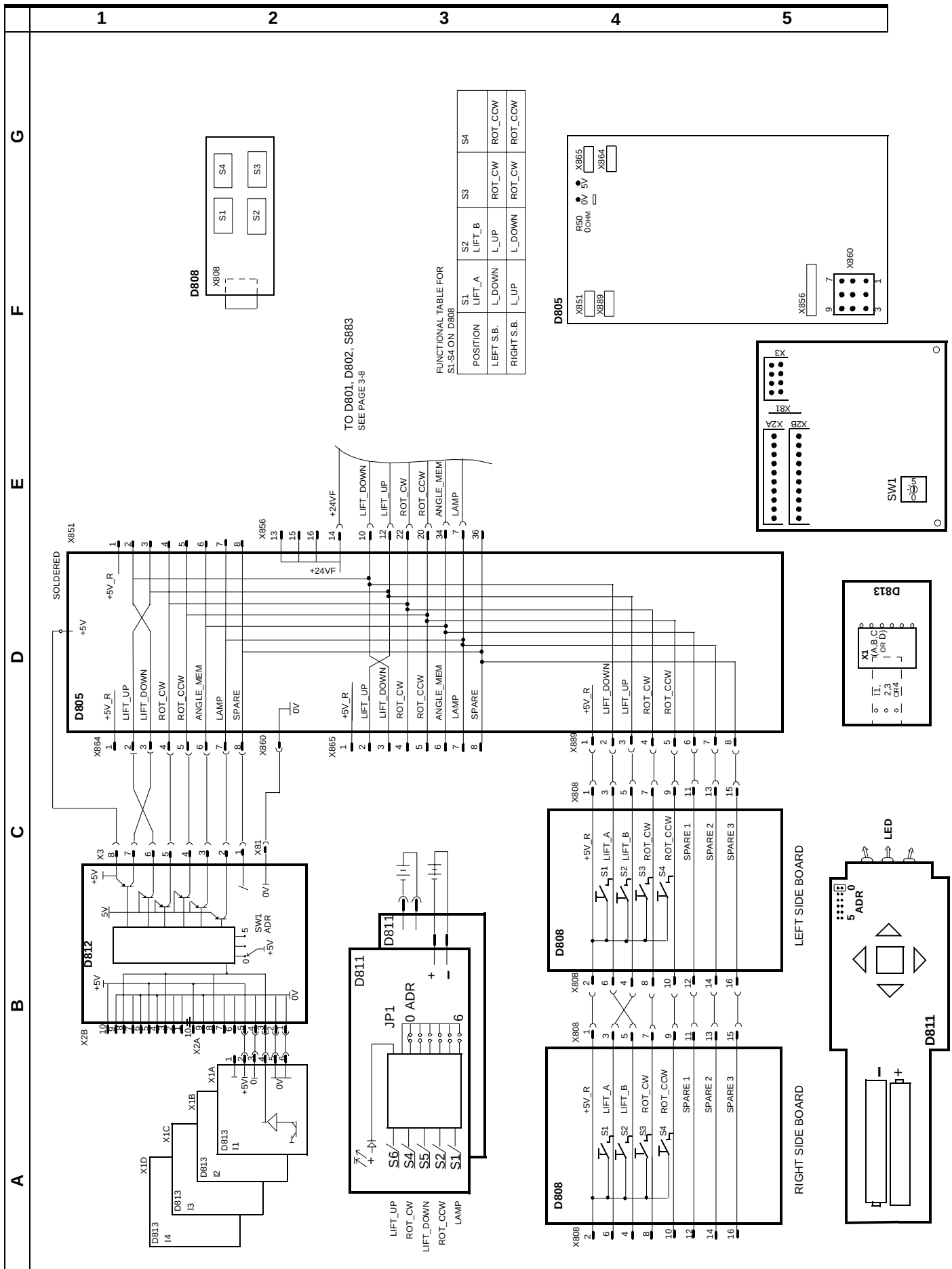
LIFT AND ROTATION MOTOR DRIVE



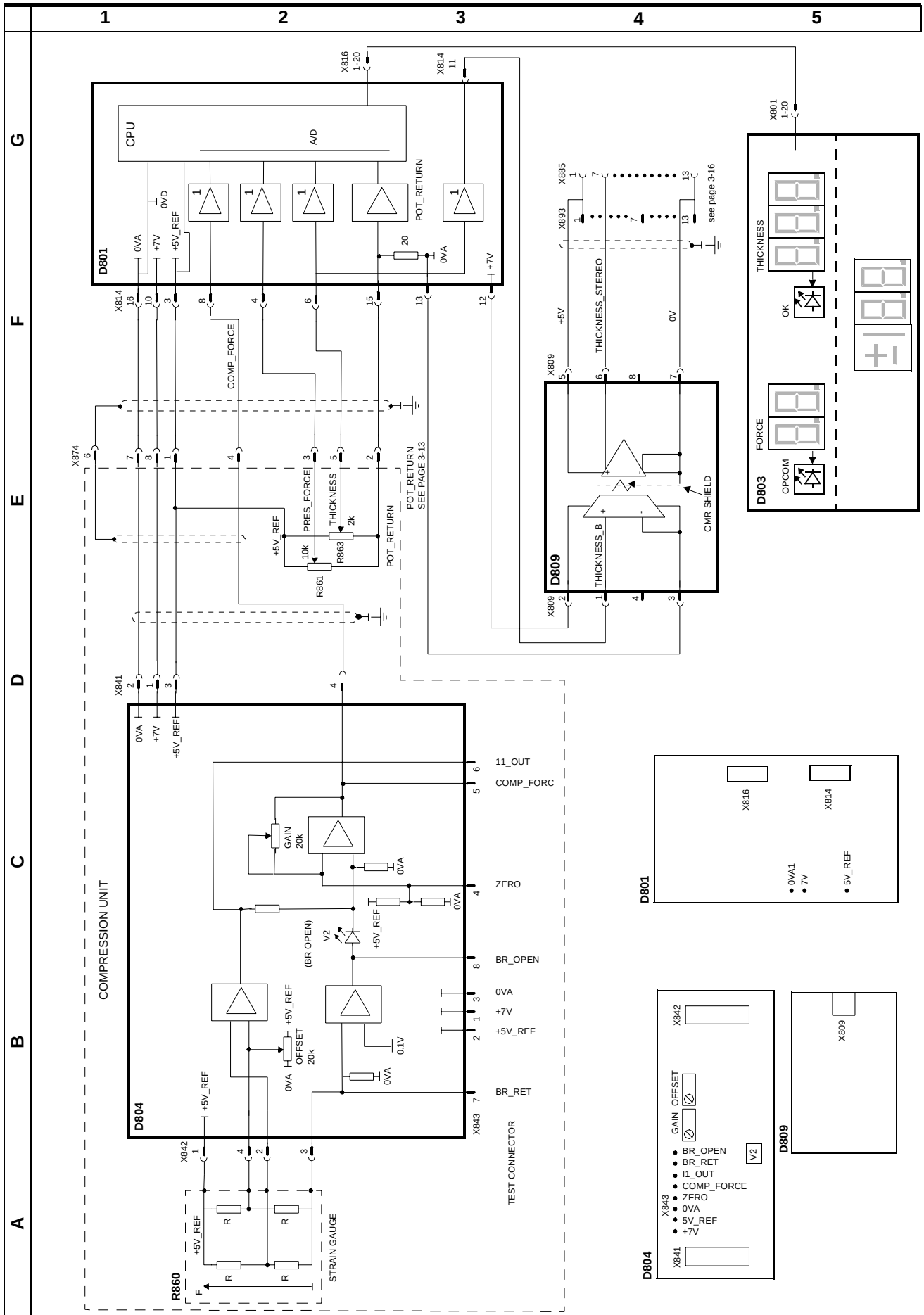
LIFT AND ROTATION SWITCHES



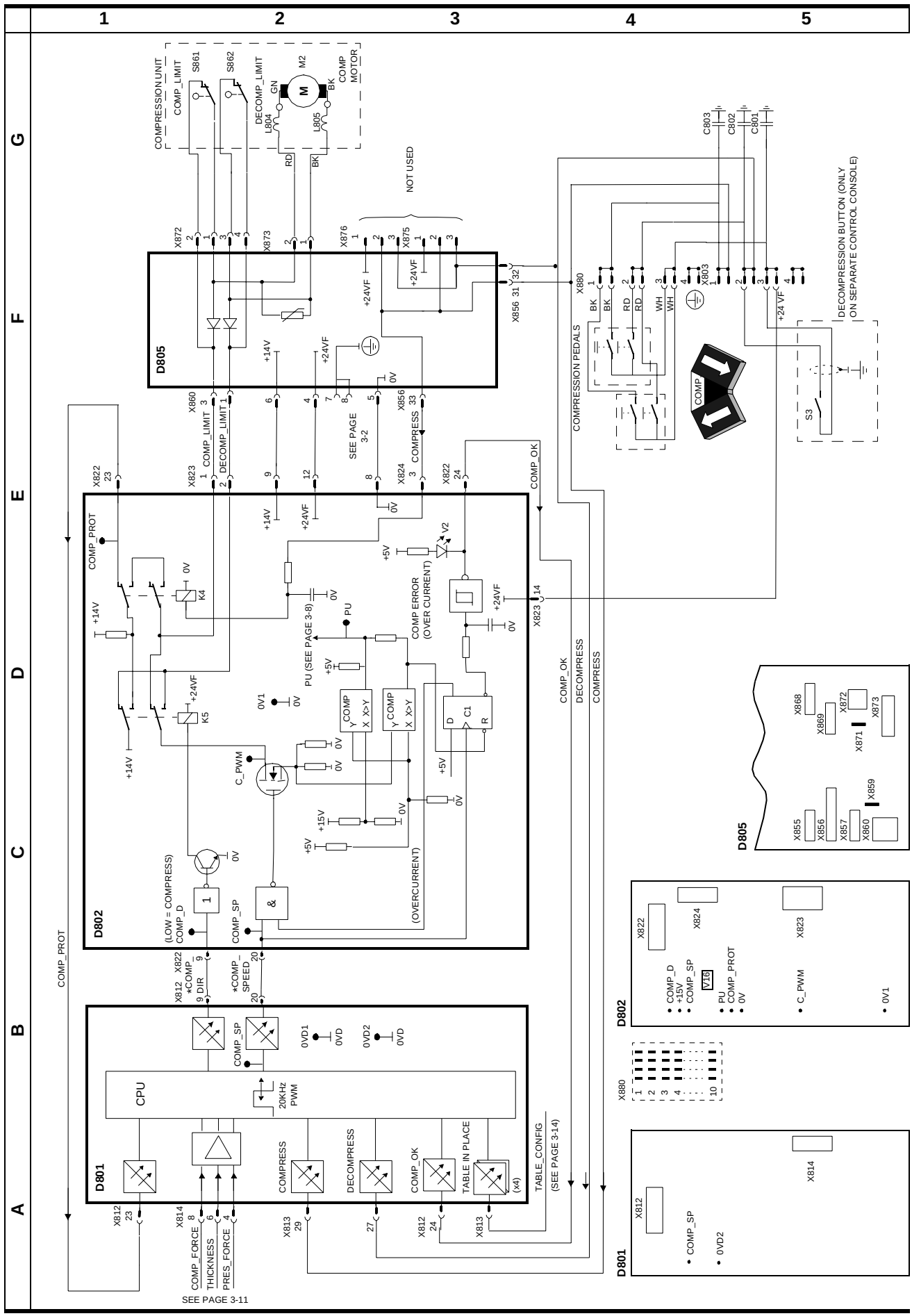
LIFT AND ROTATION SWITCHES, M1000 WITH REMOTE CONTROL



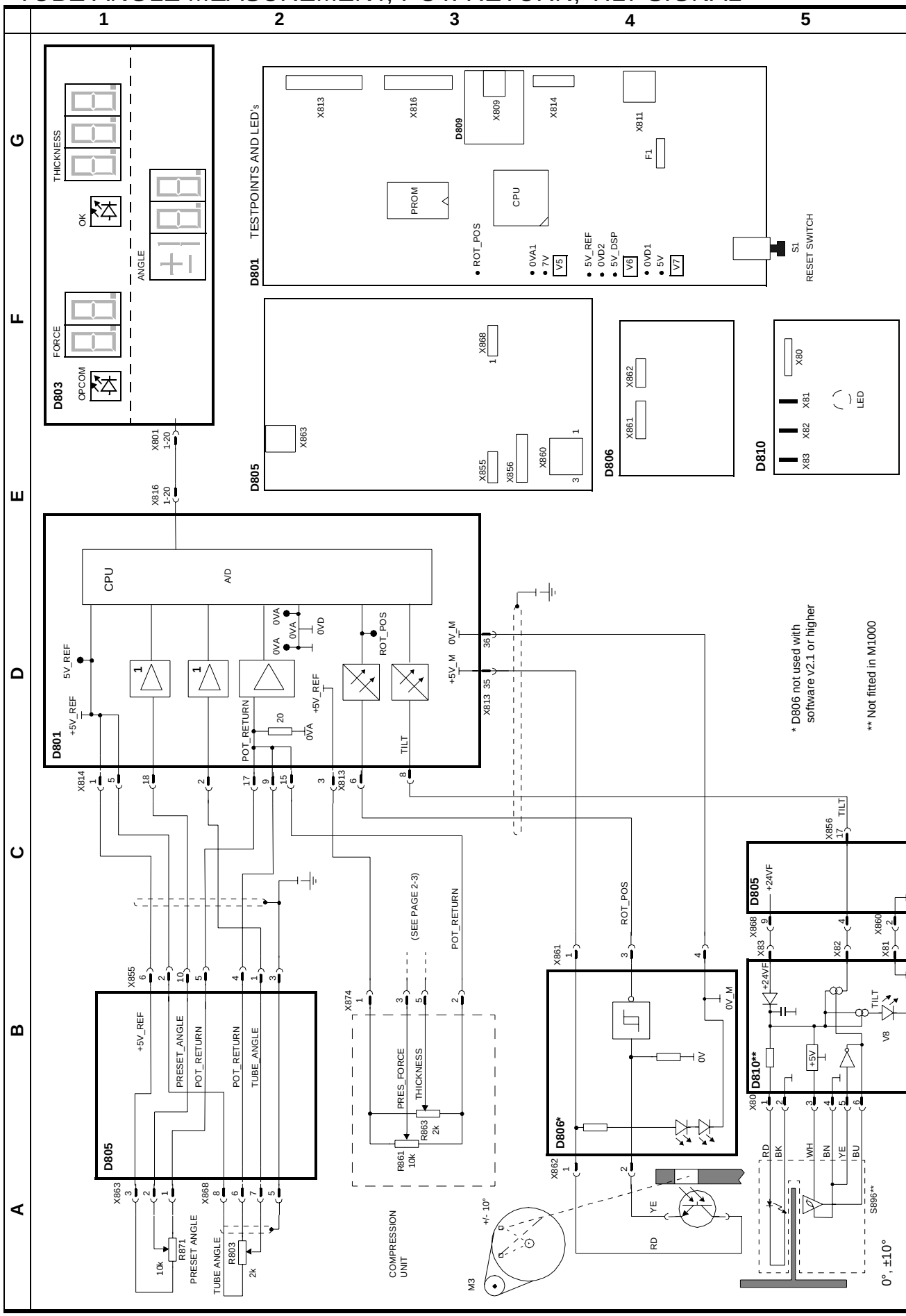
COMPRESSION MEASUREMENT SIGNALS



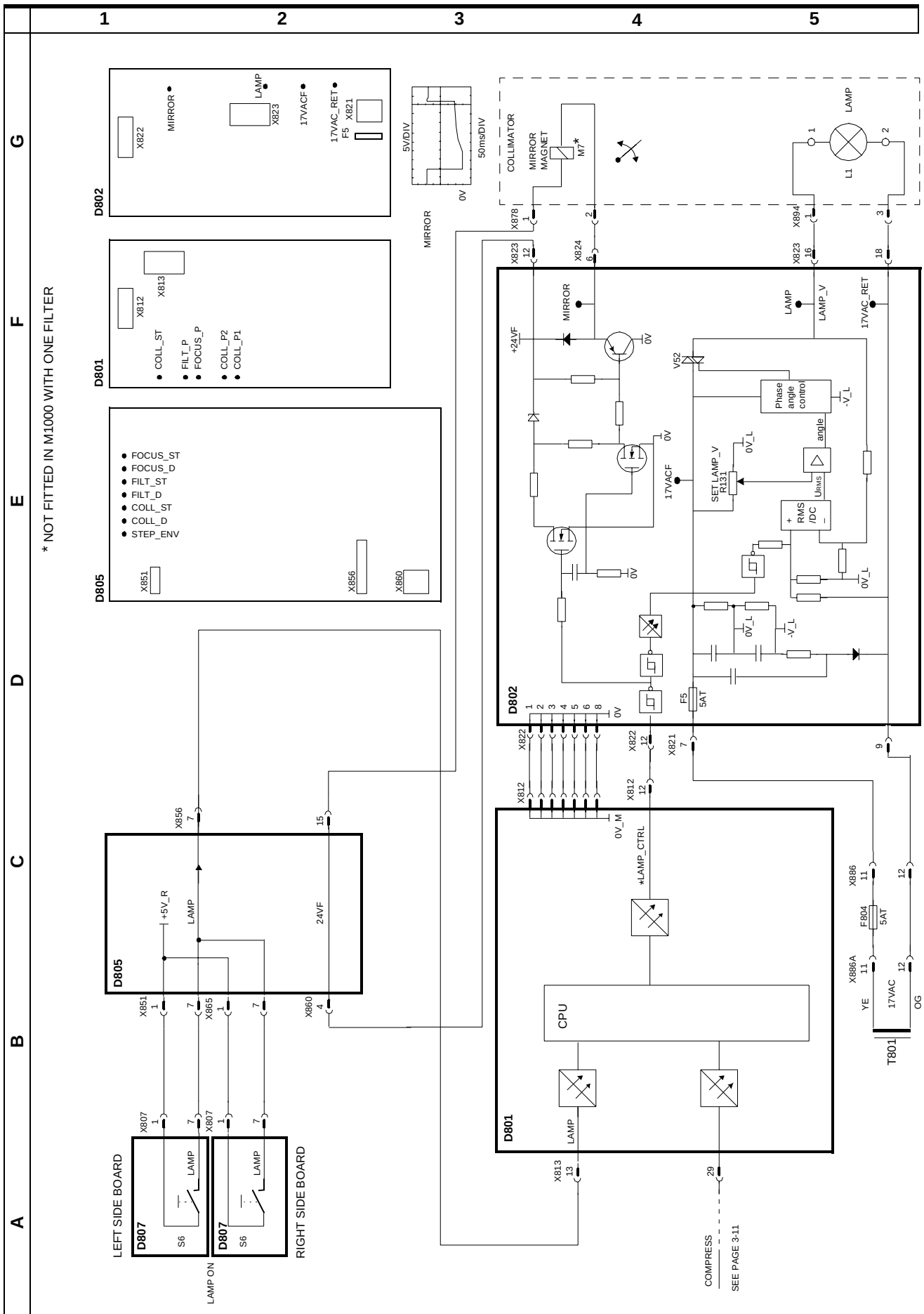
COMPRESSION MOTOR DRIVE



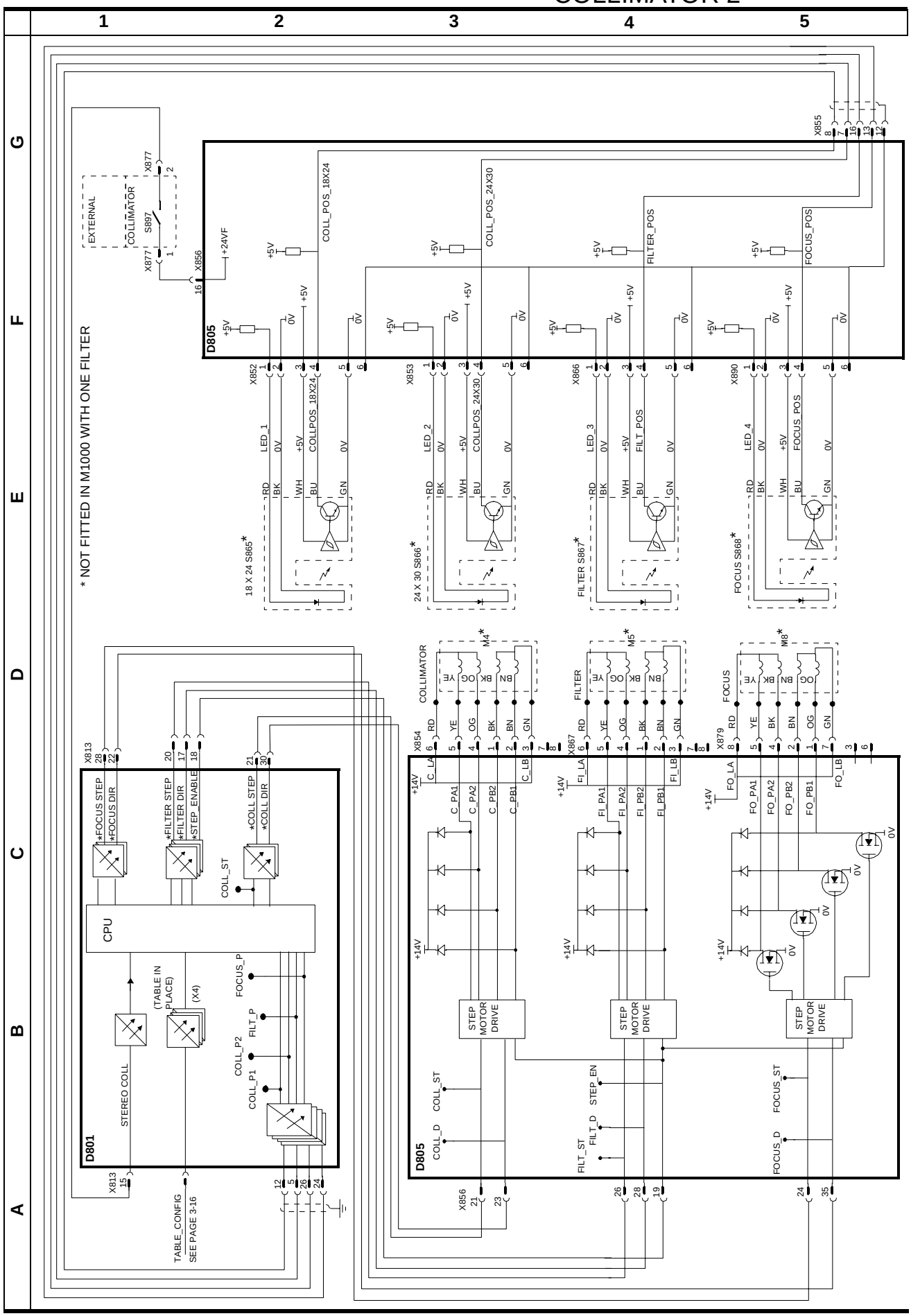
TUBE ANGLE MEASUREMENT, POT. RETURN, TILT SIGNAL



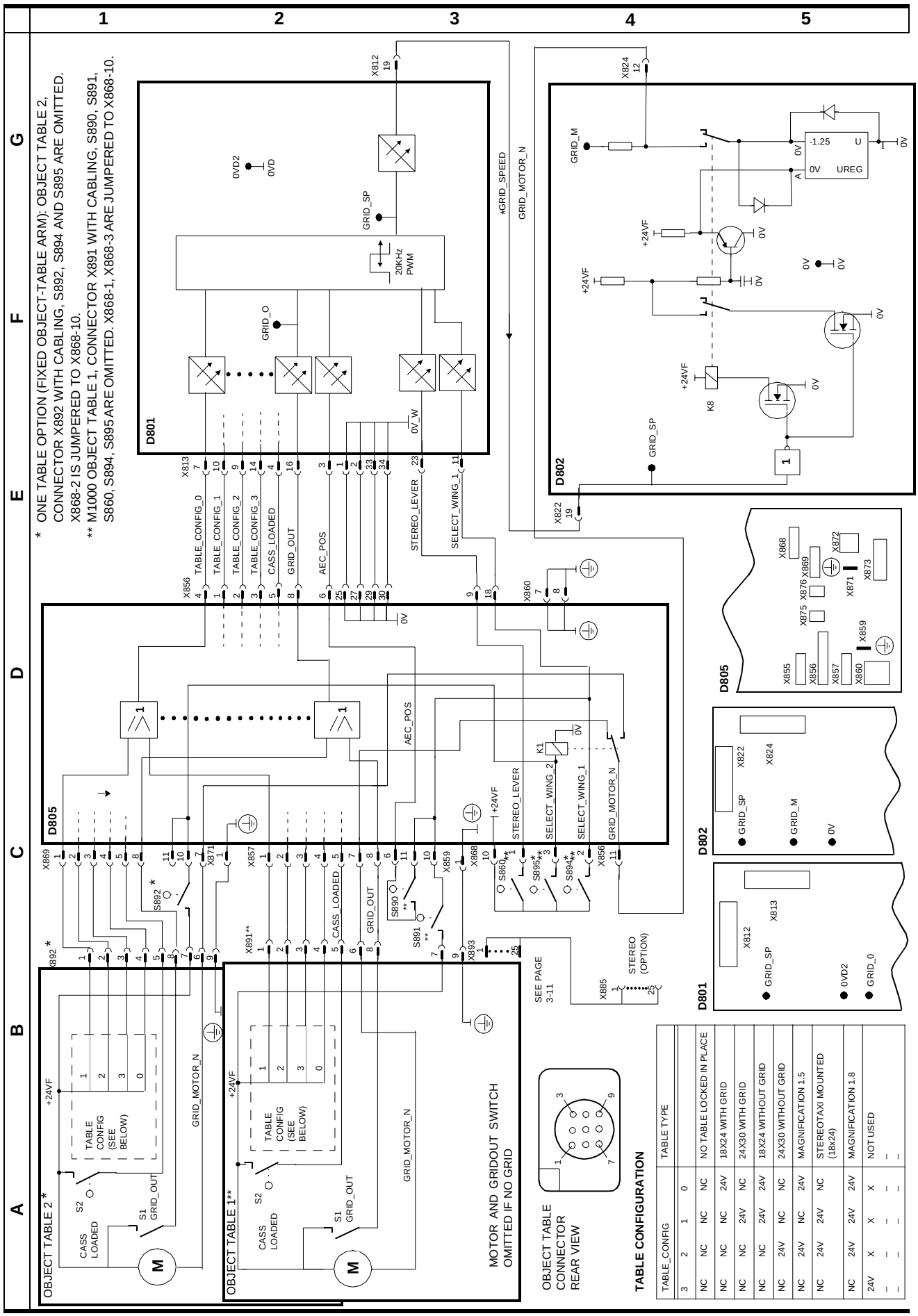
COLLIMATOR 1



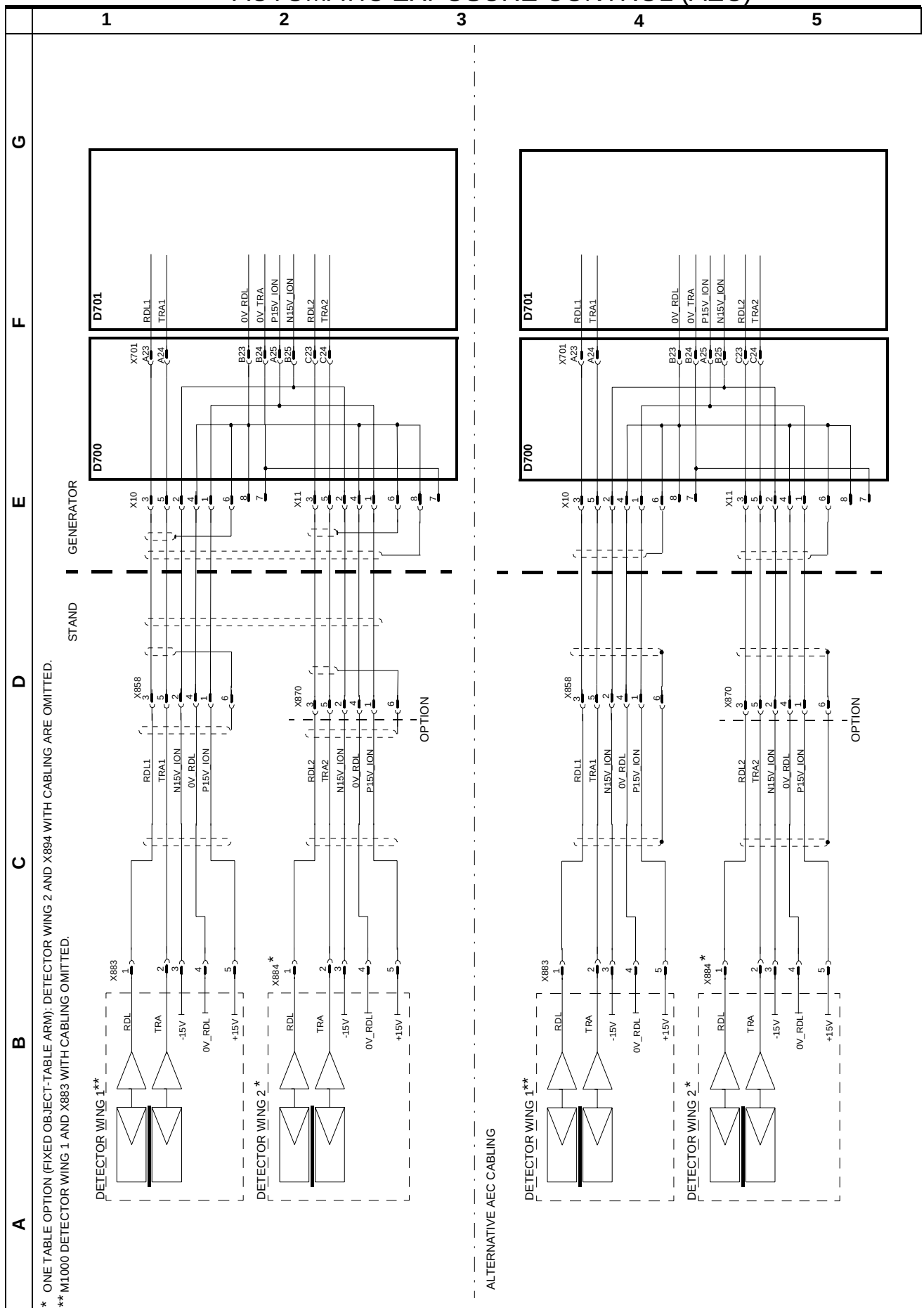
COLLIMATOR 2



OBJECT TABLE 1 + 2


* ONE TABLE OPTION (FIXED OBJECT-TABLE ARM): OBJECT TABLE 2, CONNECTOR X892 WITH CABLING, S892, S894 AND S895 ARE OMITTED. X868-2 IS JUMPERED TO X868-10.
** M1000 OBJECT TABLE 1, CONNECTOR X891 WITH CABLING, S890, S891, S860, S894, S895 ARE OMITTED. X868-1, X868-3 ARE JUMPERED TO X868-10.
D801
D802
D805
OBJECT TABLE 2*
OBJECT TABLE 1**
MOTOR AND GRIDOUT SWITCH OMITTED IF NO GRID
OBJECT TABLE CONNECTOR REAR VIEW
SEE PAGE 3-11
STEREO (OPTION)
TABLE CONFIGURATION
TABLE_CONFIG
TABLE TYPE
3 2 1 0
NC NC NC NC NO TABLE LOCKED IN PLACE
NC NC NC 24V 18X24 WITH GRID
NC NC 24V NC 24X30 WITH GRID
NC NC 24V 24V 18X24 WITHOUT GRID
NC 24V NC NC 24X30 WITHOUT GRID
NC 24V NC 24V MAGNIFICATION 1.5
NC 24V 24V NC STEREOTAXI MOUNTED (18x24)
NC 24V 24V 24V MAGNIFICATION 1.8
24V X X X NOT USED
– – – – –
– – – – –

AUTOMATIC EXPOSURE CONTROL (AEC)



The system is factory connected for 400V 2-phase mains. For other voltages see note below and page 5-3.

Note

For 1-phase connection:

- Move wire N/L2 from X899 L2 to X899 N (stand). Connect incoming phase to L1 and 0V to N.
- F20 in the generator must be short circuited with the jumper included in the installation kit.
- D711/F5 must be short circuited with the brass plug included in the installation kit.

For 240V mains connection:

- The fuse in position D711/F2 (4AT) shall be moved to position D711/F3. F2 shall be left open.

Caution:

When changes are made, the fuse values must be changed to the correct values with labels included in the installation kit. A triangle shall be placed adjacent to each open or short circuited fuse and shall cover any existing fuse value.

Subassembly and PC board overview/Baugruppen und Platinenübersicht

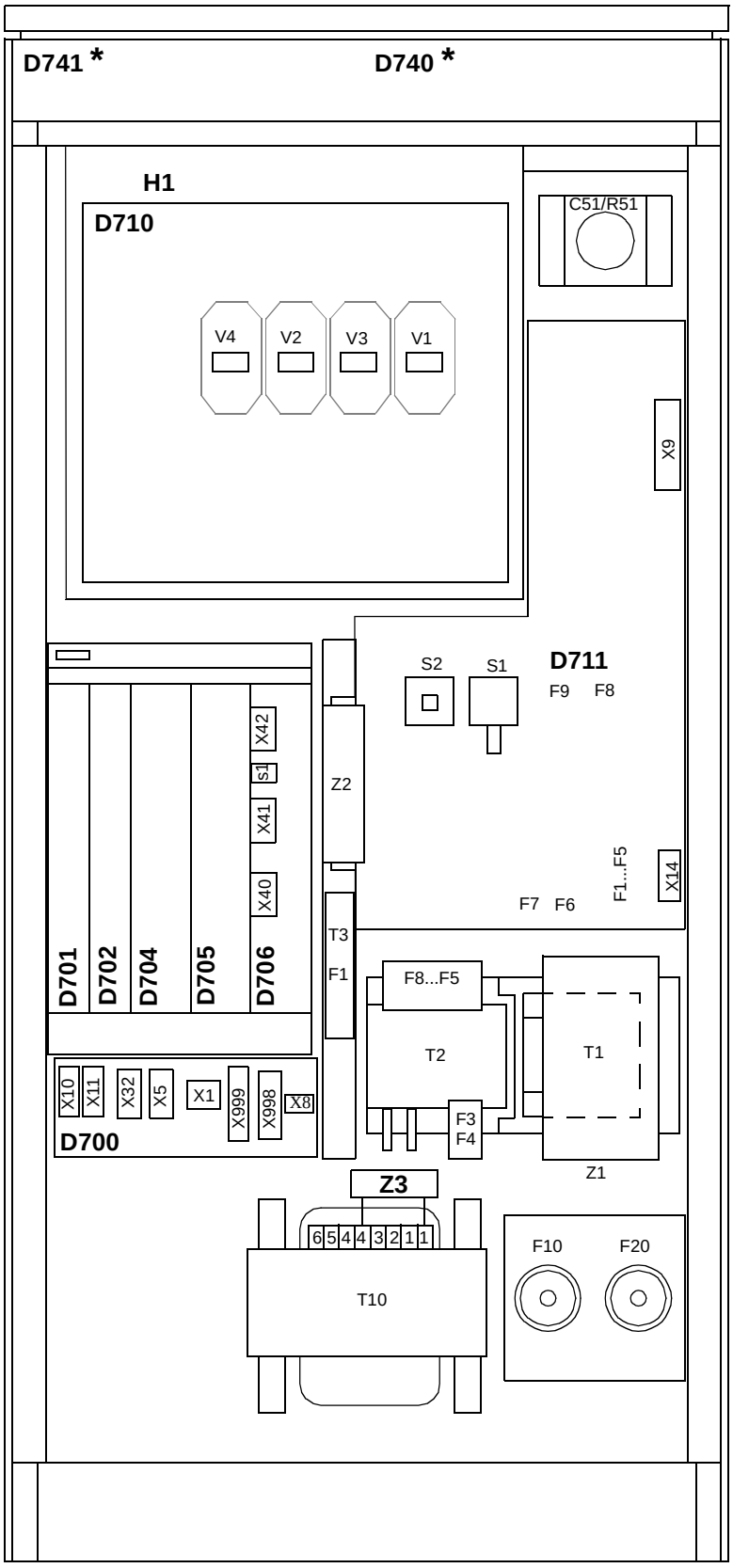
H1	High-voltage generator *Hochspannungserzeuger*
V1-V4	Transistor module *Transistormodul*
C51	Phase shift capacitor for rotary anode *Phasenschieberkondensator für Drehanode*
D700	Back plane board *Rückwand*
D701	Iontomat board *Iontomat*
D702	Master board *Master*
D704	Power supply board *Netzteil*
D705	Filament control board *Heizung*
D706	Focus selection board
D710	Inverter board (without V1-V4) *Wechselrichter (ohne V1-V4)*
D711	Power input board *Netzeingang*
D740	Control panel board *Bediendeck*
D741	Power switch board
T1	Transformer for power supply *Transformator für Spannungsversorgung*
T2	Transformer for power supply *Transformator für Spannungsversorgung*
T3	Transformer for power supply of D740
T10	Line voltage transformer *Netzspannungstransformator*
Z1	Mains filter *Netzfilter*
Z2	Mains filter *Netzfilter*
Z3	Transient protection filter

Fuses

LOCATION	FUSE		FUSED VOLTAGE
Incoming mains	F10	20 AT (35 AT) /500 V	L1 1)
Incoming mains	F20	20 AT/500 V	L2 1)
D711	F1	Not used	
D711	F2	4 AT/250 V	230V_T1 1)
D711	F3	4 AT/250 V	240V_T1 1)
D711	F4	4 AT/250 V	230V_STAND
D711	F5	4 AT/250 V	N_T1 1)
D711	F6	1.5 AT/250 V	PRIM1_T2
D711	F7	1 AT/250 V	19V_T1
D711	F8	1.5 AT/250 V	UZ
D711	F9	1.5 AT/250 V	N_UZW
T2	F3	6.25 AT/250 V	U1_HEIZ
T2	F4	0.5 AT/250 V	U2_24V
T2	F5	1 AT/250 V	U2_13V
T2	F6	1.5 AT/250 V	U2_+5V
T2	F7	1.5 AT/250 V	U2_+15V
T2	F8	1.5 AT/250 V	U2_-15V
T3	F1	1 AT/250 V	24V_AC1

NOTE! See spare parts list for replacement fuses.

1) See note on page 4-1.



* Included in the separate control console, if generator separately installed.

Fig. 10

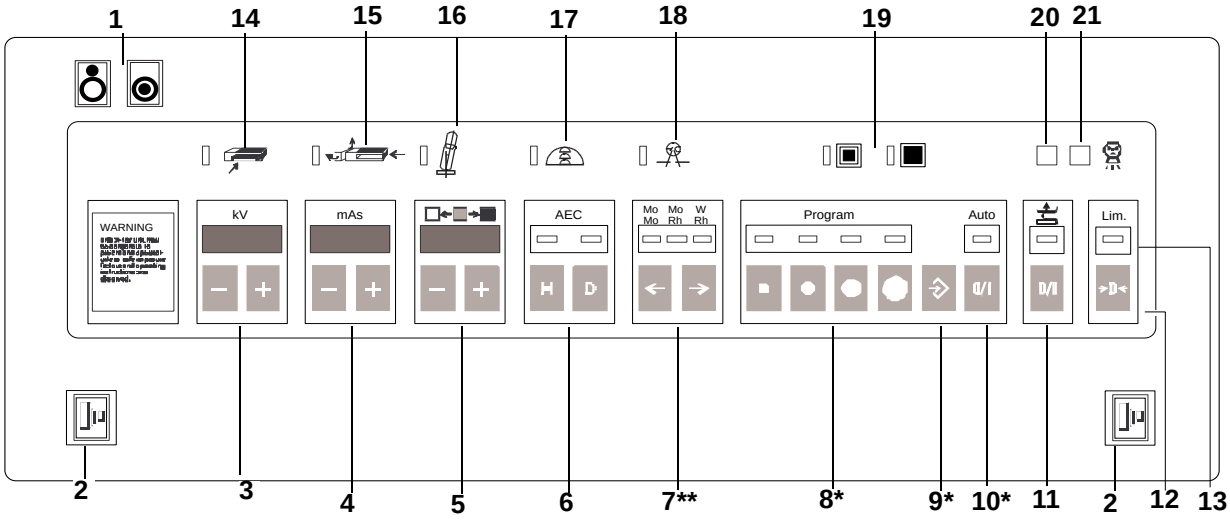


Fig. 11

1 Mammomat 3000 ON/OFF

2 Exposure release buttons with green lights. Both buttons must be pressed during the entire exposure. This is to ensure that the operator is standing behind the radiation shield during the exposure.

3 +/- kV selection and display

4 +/- mAs selection and display. In AEC mode (Automatic Exposure Control), the display remains dark before exposure. After the exposure, the mAs value reached during radiography is indicated.

5 +/- film density adjustment and display.

6 AEC. These buttons are used to activate AEC mode (Automatic Exposure Control) and to select screen/film system. H stands for high speed and D for detail screens.

7 Buttons for selection of anode/filter combination in manual mode.**

8 Buttons for selection of one of four pre-programmed exposure parameter settings.*

9 Button for storing exposure parameter (see 8).*

10 Button to select/deselect auto mode.*

11 Button to select/deselect automatic decompression after exposure. When off, use foot switch or the knobs for manual decompression.

12 Limit button (acknowledgement). Serves to reset the system after errors, indicated by an error code, or faulty exposures (limit errors), indicated also by the limit lamp and acoustic signal (e.g limit mAs, dose monitoring, interrupted exposure).

13 Limit lamp. Flashing: Tube temperature is above normal. Lit: Limit error (see 12).

14 Cassette is missing or needs to be replaced (it has already been exposed).

15 Object table or object table arm is not locked in position.

16 Risk of collision between tube head and floor (limit switch is actuated).
In stereotactic mode: The tube head is not in 0° or ± 10° position.

17 AEC detector not in chest wall position (only in stereotactic mode).

18 Diaphragm not in correct position. In stereotactic mode: External diaphragm not in position.

19 Focal spot indication. Indicates focus in operation. Small focus is automatically selected, when a magnification table is used.

20 Green light indicates that the unit is ready for exposure. This indicator has the same function as the green lights on the stand display and the exposure release buttons.

21 Yellow light and an acoustic signal indicate radiation ON.

Decompression button (only on separate control console, see overview on next page).

*Not used in M1000 **Not used in M1000 with one filter.

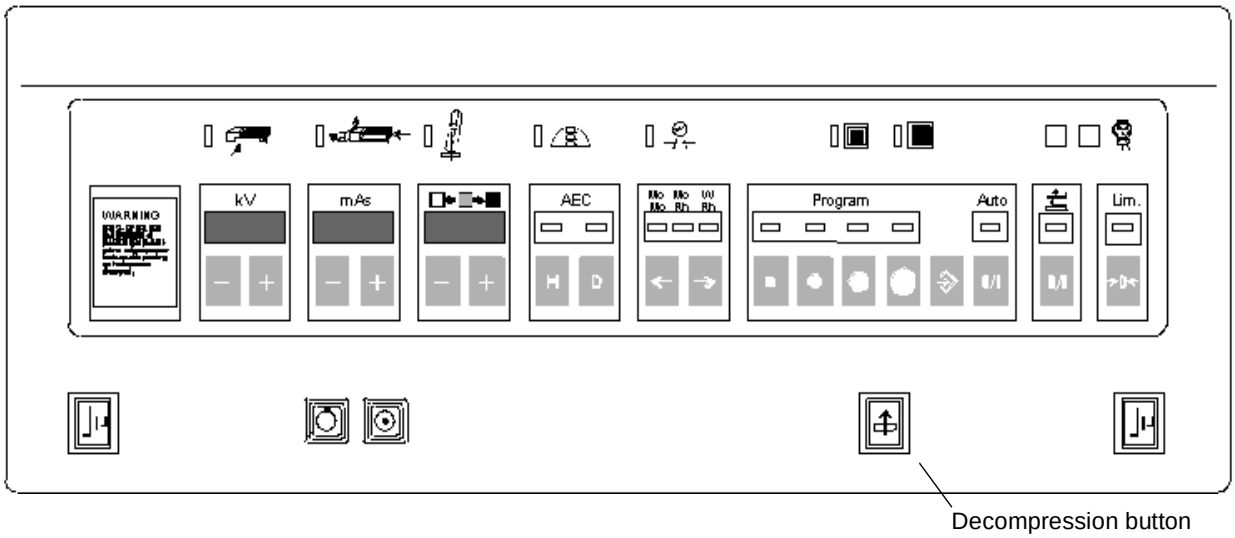


Fig. 12 Separate Control Console

Switches

Switch	Page	Origin	Description
S1	5-5/2D	D702	UZW OFF/ON ON=Upper position
S2	5-5//2D	D702	SS OFF/ON ON=Upper position
S3	5-5/3D	D702	For service PC connection: ON= Upper position For serial printer connection: OFF=Lower position
S1	5-7/1E	D706	Manual activation of Power aid unit
S1	5-3/2F	D711	System ON (Parallell with D741/S2)
S2	5-3/2F	D711	System OFF (Parallell with D741/S1)
S27A, S27B	5-10/3A	D740	Preparation and exposure release buttons
S1	5-3/2G 5-10/1B	D741	System OFF
S2	5-3/2G 5-10/1B	D741	System ON
S3	3-12/5F	Separate control console	Decompression button

Potentiometers

Potentiometers	Page	Origin	Description
R5	5-7/3D	D706	Adjustment of bias voltage for Molybden (Mo)
R4	5-7/3D	D706	Adjustment of bias voltage for Tungsten (W)

Component Overview (Generator)/Bauteileübersicht (Generator)

Component	Page	Origin	Description
K8	5-11/3F	D701	Iontomat software controlled drift measurement (NOT USED) *Iontomat Software gesteuerte Drift Messung (NOT USED)*
K1	5-6/3F	D705	Small/large focus changeover *Umschalten kleiner/großer Fokus*
K2	5-8/2D	D705	Inverter frequency changeover *Umschalten der Wechselrichterfrequenz*
K3	5-8/3D	D705	Control for brakes *Ansteuerung für Bremsen*
K1	5-7/3D	D706	MO/W bias voltage changeover
K2	5-7/3D	D706	Connects bias voltage to tube
K3	5-7/4E	D706	MO/W filament current changeover for large focus
K4	5-7/2E	D706	Bias voltage monitoring
K5	5-7/4E	D706	MO/W filament current changeover for small focus
K6	5-7/1D	D706	Relay output for xray indication
K1	5-9/3E	D710	SS relay *SS-Relais*
K2	5-9/1C	D711	By-passes intermediate circuit charging resistors *Überbrückt Zwischenkreis Ladewiderstände*
K3	5-3/2E	D711	Switches on generator and stand *Schaltet Generator und Stativ ein*
K4	5-9/3F	D711	Starting rotary anode *Anlauf Drehanode*
K5	5-9/3F	D711	Starting and braking, rotary anode *Anlauf und Bremsen Drehanode*
K6	5-3/2E	D711	System ON *System EIN*
K7	5-3/2E	D711	System supply OFF *System AUS*
K8	5-6/3C	D711	Filament intermediate circuit ON *Heizungs-Zwischenkreis EIN*
K9	5-6/3C	D711	By-passes charging resistors of the heating *Überbrückt Ladewiderstände Heizung*
K10	5-3/2E	D711	Switches on P24V *Schaltet Trafo P24V ein*
K11	5-9/1B	D711	Intermediate circuit ON *Zwischenkreis EIN*
K12	5-9/1B	D711	Intermediate circuit ON *Zwischenkreis EIN*

Page	Signal name	Origin		Destination	Testpoint	LED
5-5/1E 5-7/3C	ANODE_W_	X702.A19	=>	X706.B8		
5-5/2E 5-7/3E	ANST2_	X702.B16	=>	X705.B15		
5-5/2C	AR	X1.4 STAND	=>	X702.C13		D702.V2.GN
5-5/3E 5-8/1B	BRAKE_	X702.C8	=>	X705.C6	D705.X717	D702.V4.GN
5-5/1E	BS_	X702.B8	=>	D711.X3.12	D702.X984.BS	
5-8/4E	CNT	X705.A11	=>	X702.A13	D702.X966.CNT	
5-5/1E	DS_	X702.C7	=>	D711.X3.13	D702.X982.DS	
5-5/2E	FOKUS_	X702.B10	=>	X705.B8		
5-5/3E	IHREG	X702.A11	=>	X705.A9	D702.X968.IHREG	
5-5/4F 5-6/4B	IHSOLL	X702.C23	=>	X705.C27	D705.X705 IHref. 1V=1A	
5-5/4C 5-6/4B	IHIST	X705.C28	=>	X702.C24	D705 .X704 IHact. 1V=1A	
5-8/2E	IMAX_WR	D710.X2.10	=>	X705.C12		D705.V40.GE $WR_{AUSTAST}$
5-8/4E	ISCHWING1	D710.X2.18	=>	X705.A12	D705.X710 I Swing 1V=10A	
5-5/4E 5-8/1B	KVA_		X701.C9X 702.C9X70 5.C7		D705.X715	
5-5/4E 5-8/1B	KVE_	X702.B9	=>	X701.B9 X705.B15	D705.X714	D702.V3.GN
5-8/3C	KVIST	D710.X73	=> X702.A24	X705.B11	D705.X711 kVact. 1V = 5kV	

“SIGNAL_” = ”SIGNAL” is active low

Signal name	Explanations
ANODE_W_	Activates relays K1, K3 and K5 on D706. Selects filament current and bias voltage for tungsten (W)
ANST2	Blocks V2 and V3 of the inverter at braking. *Blockiert V2 und V3 des Wechselrichters beim Bremsen.*
AR	Signal given to generator as exposure request. If grid used, grid has started. *Rasterkontrakt vom Aufnahmetisch zum Einschalten der Aufnahme.*
BRAKE_	Anode braking after exposure end. *Abbremsen der Drehanode nach dem Ende der Aufnahme.*
BS_	Controls the relay K5 on D711 for braking. K5 is also energized at boost of anode rotation. *Steuert Relais K5 auf D711 an zum Abbremsen. K5 ist aber auch beim Anlauf det Drehanode angesteuert.*
CNT	Enables the MASTER to count the periods of the inverter at anode rotation boost. *Ermöglicht dem MASTER das Zählen der Schwinungen des Wechselrichters beim Hochlauf.*
DS_	Controls the relay K4 on D711 to start anode rotation boost. *Steuert Relais K4 auf D711 an zum Anlassen der Drehanode.*
FOKUS_	Controls the relay K1 on D705 to select, large focus. *Steuert Relais K1 auf D705 an zur Anwahl, großer Fokus.*
IHREG	Turns the filament regulator on. The regulator is on at standby, preparation and exposure, i.e. always after the power-on initialisation of the generator. *Schaltet den Heizungsregler ein. Der Regler ist EIN in STANDBY, Vorbereitung und Aufnahme, das heißt immer, wenn der Generator initialisiert hat.*
IHSOLL	The reference value for the filament current is given from the MASTER to the regulator. *Der Heizstrom - Sollwert wird vom MASTER zum Regler gegeben.*
IHIST	The actual value for the filament current can be read by the MASTER. *Der Heizstrom - Istwert kann vom MASTER gelesen werden.*
IMAX_WR	The maximum current of one of the 4 POWER MOS-FET modules is exceeded. *Der maximale Strom von einem der 4 POWER MOS-FET in dem Wechselrichter ist überschritten.*
ISCHWING1	The output current in the inverter is measured at anode rotation boost, exposure and braking. *Der Schwingstrom im Wechselrichter wird gemessen bei Hochlauf, Aufnahme, Bremsen.*
KVA_	WIRED-OR line is “1” during the exposure and can be pulled to “0” at any time during the exposure by D701 or D702, or D705. During the anode rotation boost, exposure, braking the KVA signal is “1” to enable the inverter. ATTENTION: The signal is inverted at measuring point D705.X715 *WIRED-OR Leitung ist “1” während der Aufnahme und kann jederzeit von D701 oder D702 oder D705 “0” gezogen werden zum Abschalten der Aufnahme. Während Hochlauf, Aufnahme, Bremsen ist KVA “H” damit der Wechselrichter freigegeben ist.* *ACHTUNG: Am Meßpunkt D705. X715 ist das Signal invertiert.*
KVE_	Output signal from the MASTER start the exposure. *Signal ausgegeben von MASTER zum Einschalten der Aufnahme.*
KVIST	The kVactual value is given by the D710 to the MASTER and to the regulator D705. *Der kVist Wert wird vom D710 zum MASTER gegeben und zum Regler D705.*

Page	Signal name	Origin		Destination	Testpoint	LED
5-5/4F 5-8/2B	KVSOLL	X702.A23	=>	X705.A27	D705.X712 kVref. 1V = 5kV	
5-5/3C 5-8/3D 5-11/1C	KV>17	X705.B10	=>	X702.B12		D705.V39.GE
5-5/3C 5-7/4E	KV>50	X705.C10	=>	X702.C12		D705.V41.GE
5-6/5B	MAIST	D710.X2.22	=>	X705.B28	D705.X707 mAact. 1V = 40mA	
5-5/5C 5-65B	MAIST_CAL	X705.B29	=>	X702.B25		
5-5/3E 5-6/4B	MAREG	X702.B11	=>	X705.B9	D702.X969.MAREG	
5-5/4F 5-6/4B	MASOLL	X.702.B23	=>	X705.B27	D705.X706 mAref. 1V=40mA	
5-5/5E	MPS	MASTER: X702.A17(Master)	<=>	SLAVES: X5.4 (Control Panel) X701.A17 (Iontomat) X1.2 (Stand)		
5-5/2E	NSE1_	X702.A7	=>	X711.X3.11	D702.X980	
5-5/1E	NSE 2_	X702.B7	=>	D711.X3.7	D702.X981	
5-5/1C	OKT1_	X1.9 STAND	VIA D706	X702.A15		
5-5/1C	OKT2_	X1.8 STAND	VIA D706	X702.B15		
5-5/2C	PH1_	D710.X2.2	=>	X702.A14		
5-11/4D 5-11/4D	RDL_1 RDL_2	X10.3 X11.3	=>	X701.A23 X701.C23	D701.X341 (RDL)	
5-5/3E 5-8/4B	RESET_FF_	X702.C11	=>	X705.C9		
5-5/2E 5-8/2E	SS_	X702.A8	=>	X705.A6 D710.X6.1	D702.X983	

“SIGNAL_” = ”SIGNAL” is active low

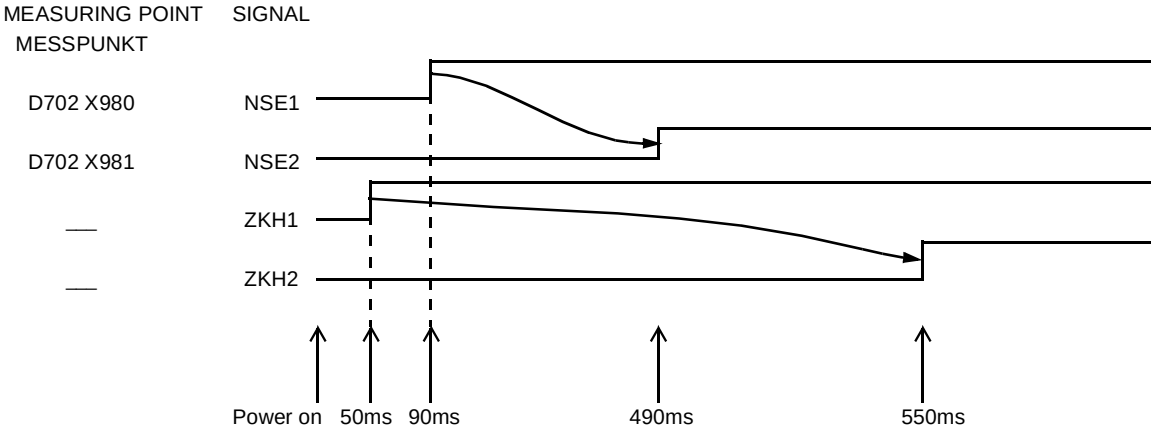
Signal name	Explanations
KVSOLL	The kVreference value is given by the MASTER to the regulator D705. *Der kVsoll Wert wird vom MASTER zum Regler D705 gegeben.*
KV>17	As soon as kVactual value exceeds 17kV, this will be considered as “X-Ray on” and is reported to the MASTER. *Sobald kVist 17 kV überschritten hat, wird dies als “Strahlung vorhanden” bewertet und dem MASTER gemeldet.*
KV>50	If kVactual value exceeds 50 kV this is considered as a faul and latched on the D705 in a FLIP-FLOP. *Überschreitet kVist 50 kV so wird dies als Fehler bewertet und auf der D705 in einem FLIP-FLOP gespeichert.*
MAIST	The actual value of the tube current is given to the regulator D705. *Der mA ist wert wird zum Regler D705 gegeben.*
MAIST_CAL	This value is fed to the MASTER and it calculates the mAs-product for exposure termination, when the requested mAs are reached. For Iontomat mode the mAs product is calculated. *Dieser Wert wird dem MASTER zugeführt und dieser bildet daraus das mAs-Produkt zum Abschalten wenn die gewünschten mAs erreicht wurden, respektiv zur mAs-Nachanzeige bei Iontomat Betrieb.*
MAREG	If X-rays are present, an tube current regulator is additionally connected to the filament regulator. *Sobald Strahlung vorhanden ist, wird dem Heizstromregler noch zuzätzlich der Röhrenstromregler aufgeschaltet.*
MASOLL	The reference value for mA is given from the Master to the regulator D705. *Der mA-Sollwert wird vom Master zum Regler D705 gegeben.*
MPS	Multi processor serial communication interface. For information exchange Master-Slaves. Serieller Datenaustausch Master-Slave.
NSE1_	Power-on of the intermediate voltage UZ by relays K11 and K12 through damping resistors. *Einschalten der Zwischenkreisspannung UZ durch Relais K11 und K12 über Dämpfungswiderstände.*
NSE 2_	Controls the relay D711. K2, bypassing the damping resistors. *Steuert das Relais D711. K2, welches die Dämpfungswiederstände überbrückt.*
OKT1_	Overtemperature of the tube housing is announced to the MASTER. *Übertemp. Strahlergehäuse wird dem MASTER gemeldet.*
OKT2_	Overpressure of the tube housing is announced to the MASTER. In serial with door switch and bias voltage monitoring. (D706). *Überdruck im Strahlergehäuse wird dem MASTER gemeldet.*
PH1_	Overpressure of the HT generator tank is announced to the MASTER. *Überdruck Hochspannungstrafo wird dem MASTER gemeldet.*
RDL_1 RDL_2	Power of dose signal, comes from the double detector, is only used on board D701. *Signal Dosisleistung, kommt vom Doppeldetektor, wird nur auf der D701 Platine verarbeitet.*
RESET_FF_	Reset of the fault latching flip-flop kV>50 by the MASTER. *Zurücksetzen des Fehlerspeicher - FLIP-FLOP kV>50 durch den MASTER*
SS_	On board D705 the relay K2 switches the frequency to ROT - ANODE 160Hz. On board D710 the relay K1 disconnects the H. V. transformer. *Auf D705 schaltet K2 die Frequenz um auf Rot - Anode 160Hz. Auf D710 schaltet K1 den Hochspannungstrafo ab.*

Page	Signal name	Origin		Destination	Testpoint	LED
5-11/5D 5-11/5D	TRA_1 TRA_2	X10.5 X11.5	=>	X701.A24 X701.C24	D701.X342 (TRA)	
5-5/2C 5-8/5E	U_ANST_	D710.X2.26	=>	X702.A18		
5-8/1F	UZIST	D710.X2.8	=>	X702.A29 X705.A25	D705.X713 UZ IST 1V = 50V	D710.V24.RT
5-5/2C	VH	X702.B13	=>	X1.5 GERÄT	D702.X967.VH	
5-5/3E 5-6/4B	WENDEL_	X702.A10	=>	X705.A8		
5-8/3E	WR_ANST1	X705.A13	=>	D710.X6.14		
5-8/3E	WR_ANST2	X705.B13	=>	D710.X6.15		
5-5/3C 5-8/1E	WR_AUSTAST_	X705.A10	=>	X702.A12		D705.V40.GE
5-5/3E 5-8/1B	ZBL_	X702.A9	=>	X705.A7	D705.X716	D702.V1.GN
5-5/2E 5-6/3B	ZK_HEIZ1_	X702.C10	=>	D711.X3.1		
5-5/2E 5-6/3B	ZK_HEIZ2_	X702.A16	=>	D711.X3.4		

“SIGNAL_” = ”SIGNAL” is active low

Signal name	Explanations
TRA_1 TRA_2	Signal of the double detector to evaluate the object tranparency. Is used only on board D701. *Signal von Doppeldetektor zum Ermitteln der Transparenz des Objektes. Wird nur auf der D701 Platine verarbeitet.*
U_ANST_	Check if +15V to control the POWER - MOS modules is present. *Überwachung ob +15V zum Ansteuern der POWER MOS - Module vorhanden ist.*
UZIST	Actual value of the inverter intermediate voltage. The LED V24 on board D710 is on at UZ>30V. *Ist - Wert Zwischenkreisspannung Wechselrichter. LED V24 auf D710 ist an bei UZ>30V.*
VH	The stand is informed that the generator has completed its preperation. *Dem Gerät wird mitgeteilt, daß der Generator die Vorbereitung beendet hat.*
WENDEL_	The filament regulator on board D705 is informed which filament is connected. From this results the limitation of IHmax to 5,8A or 8,3A. *Dem Heizungsregler auf D705 wird mitgeteilt welcher Heizfaden angeschlossen ist. Daraus ergibt sich die Bergrenzung von IHmax bis 5,8A oder 8,3A.*
WR_ANST1	Control of POWER - MOS module V1 and V4. *Ansteuerung POWER MOS - Module V1 und V4.*
WR_ANST2	Control of POWER - MOS module V2 and V3. *Ansteuerung POWER MOS - Module V2 und V3.*
WR_AUSTAST_	By exceeding of Imax in the inverter, the inverter control is disabled during 200ms. *Bei Überschreiten von Imax im Wechselrichter wird die Ansteuerung für 200ms unterbrochen.*
ZBL_	The MASTER enables the power section (e. i. inverter) to make preparation. *Der MASTER gibt den Leistungsteil (d. h. Wechselrichter) zu Vorbereitung frei.*
ZK_HEIZ1_	The relay K8 switches the filament intermediate circuit on through damping resistors. *Relais K8 schaltet den Heizungszwischenkreis über Dämpfungswiderstände ein.*
ZK_HEIZ2_	The relay K9 bypasses the damping resistors. *Relais K9 überbrückt die Dämpfungswiderstände.*

POWER-ON SEQUENCE
EINSCHALTSEQUENZ



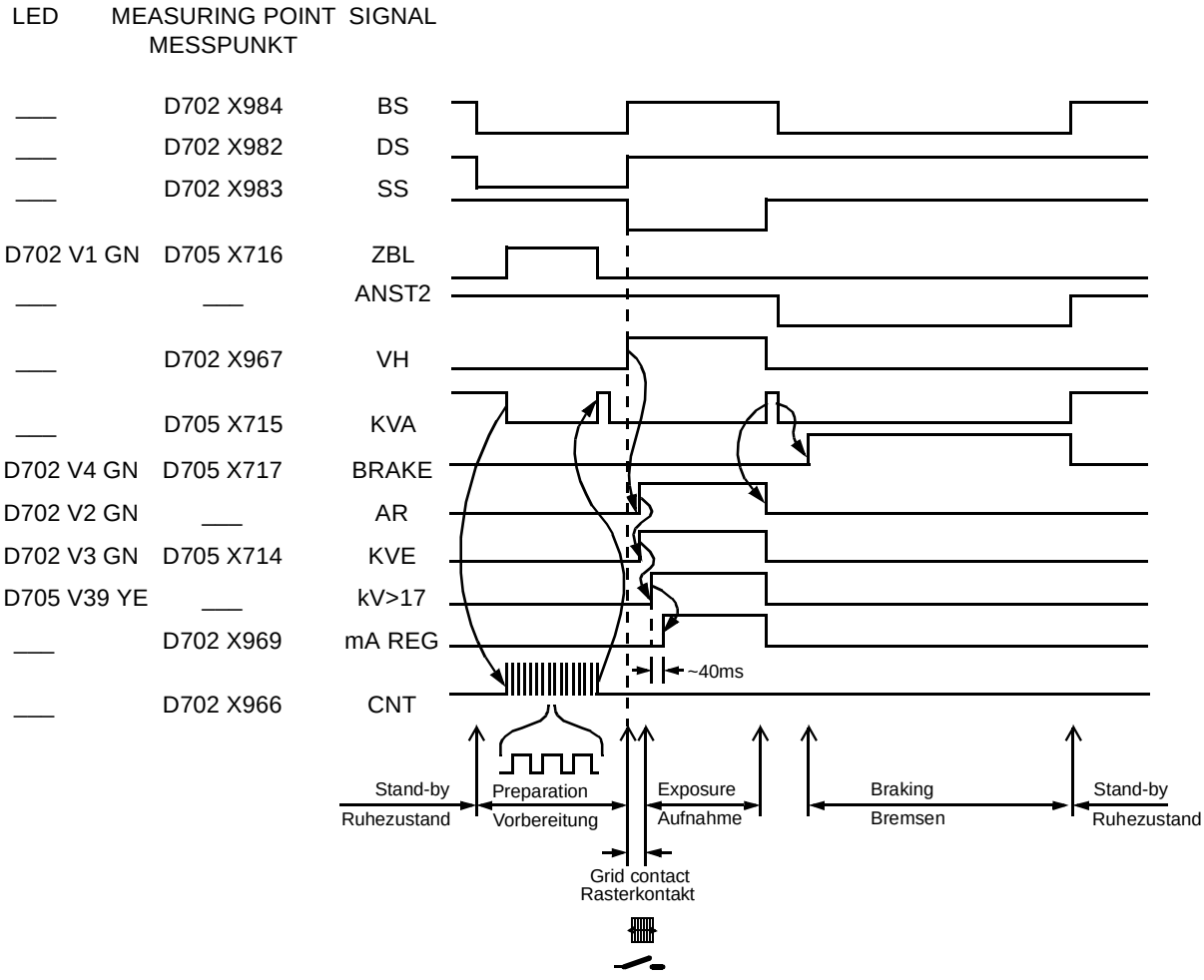
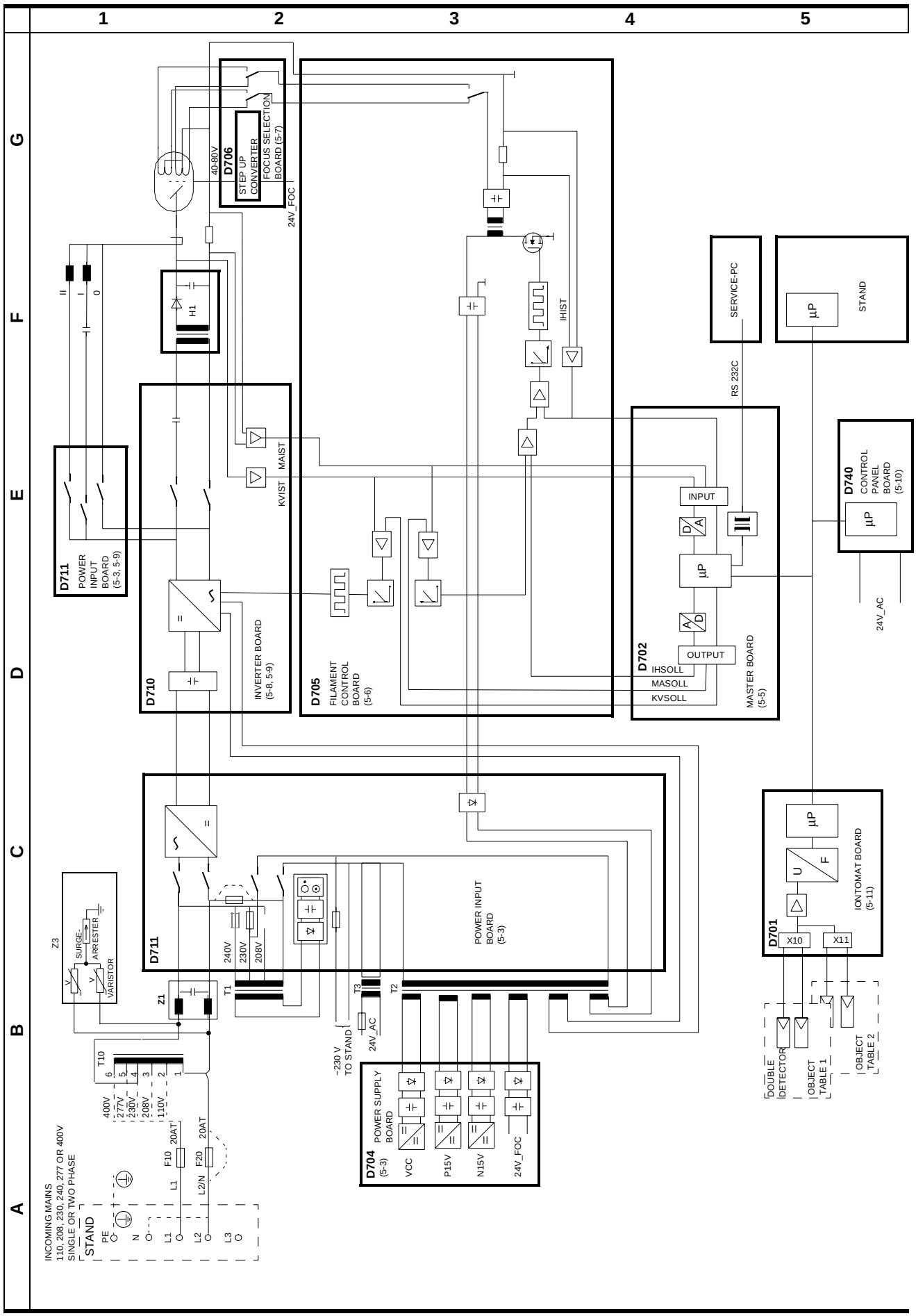
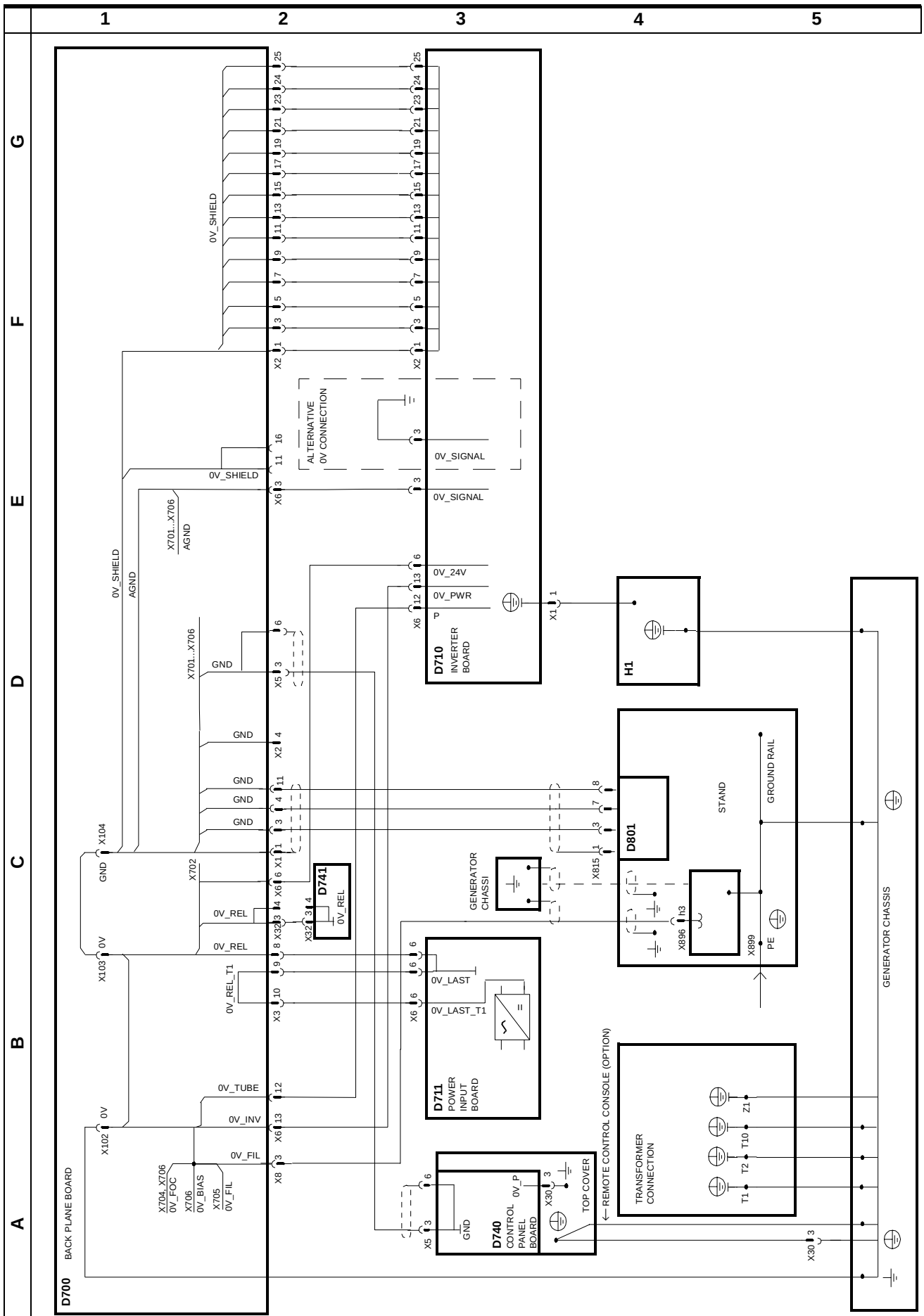


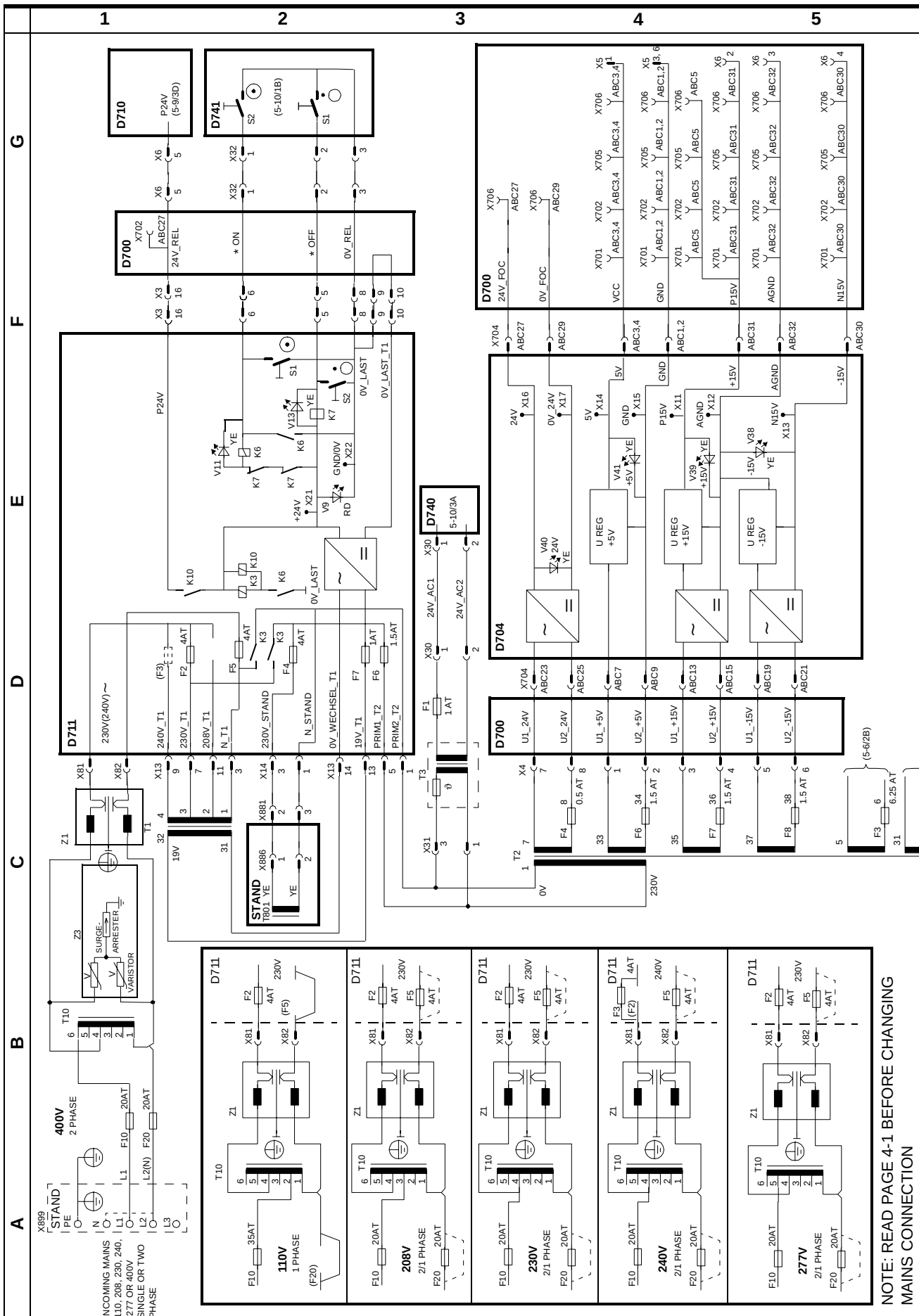
Fig. 13

BLOCK DIAGRAM

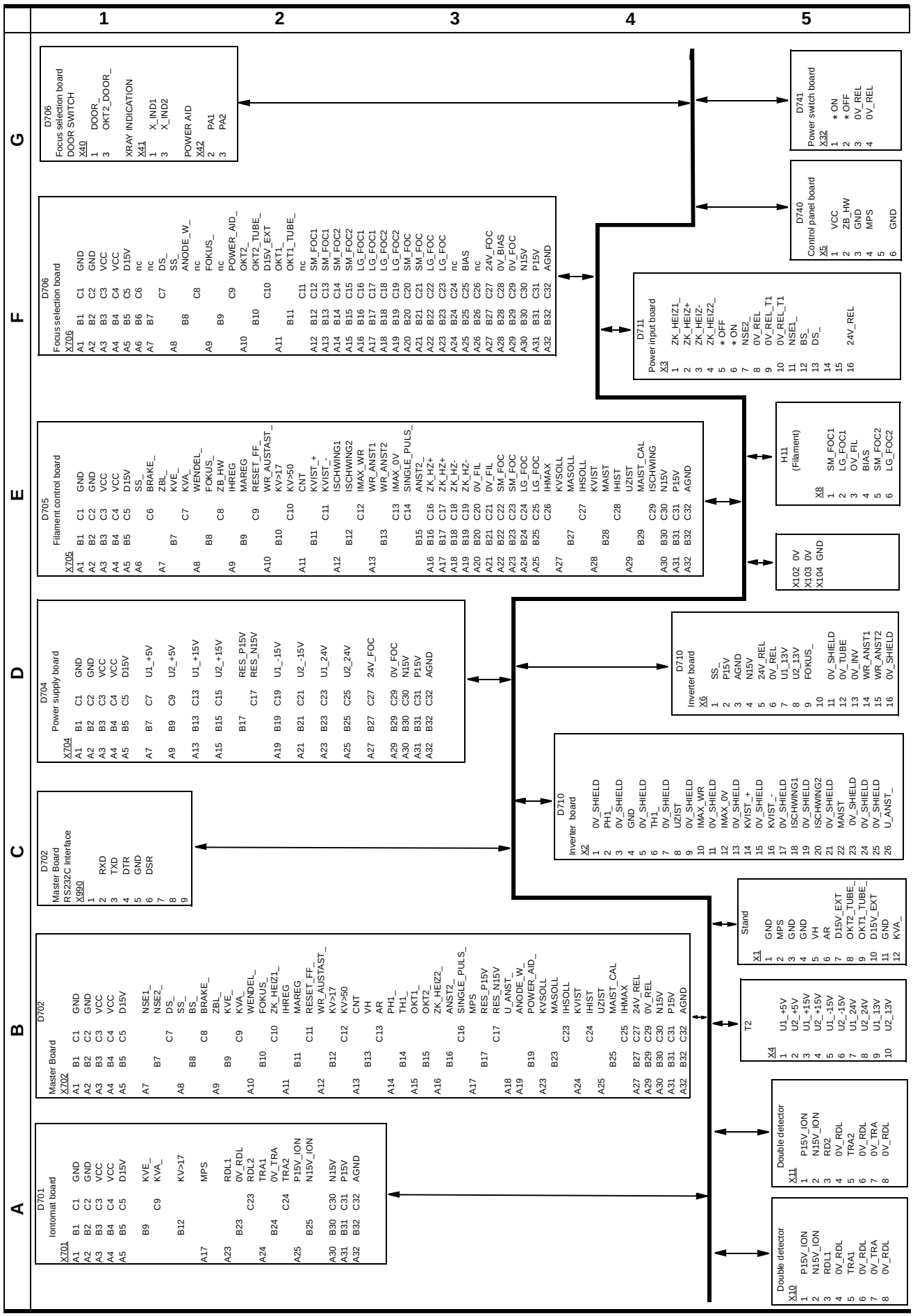


GROUND, 0V AND PROTECTION GROUND DISTRIBUTION

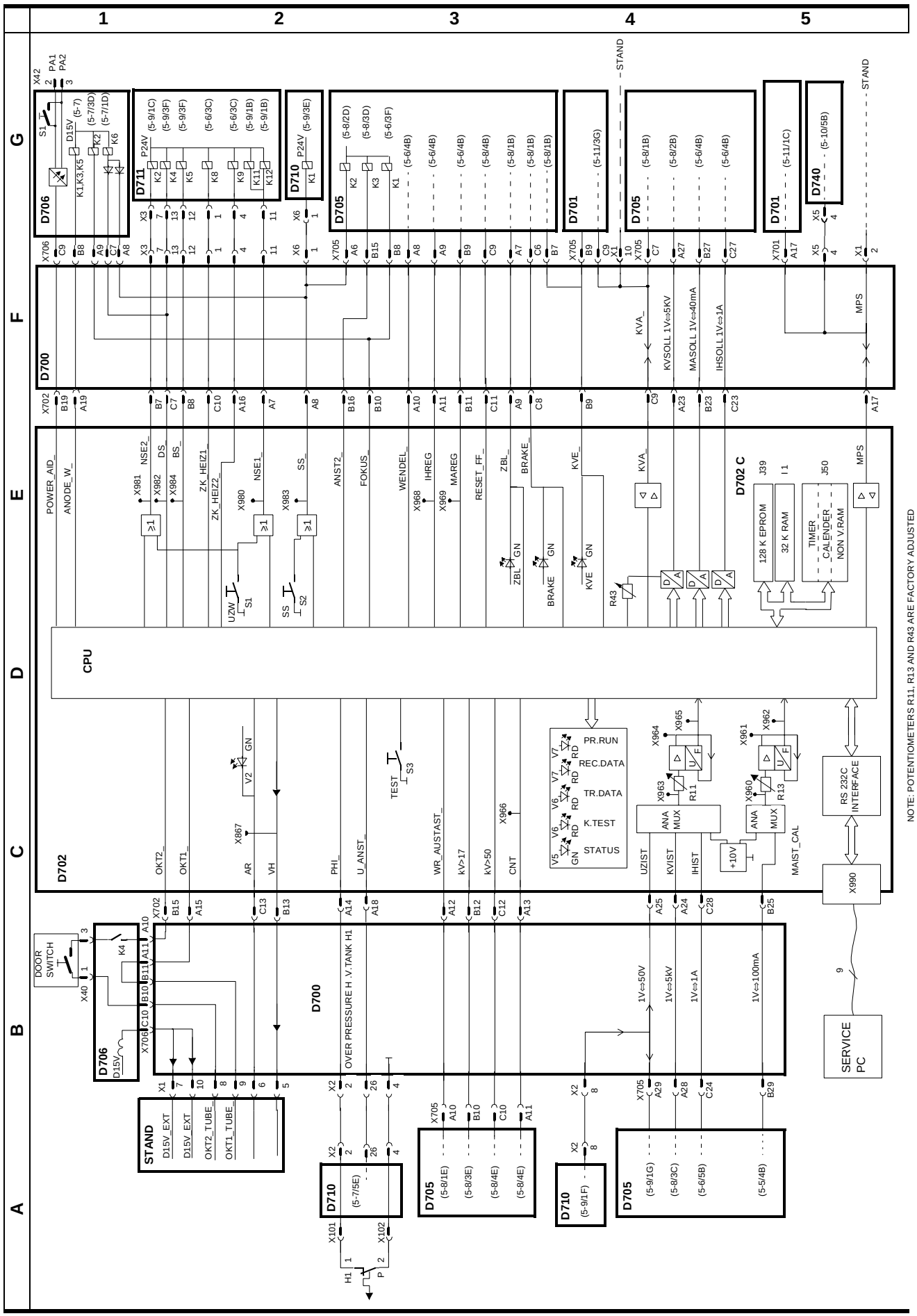



1
2
3
4
5
A
B
C
D
E
F
G
D710
P24V (5-9/3D)
D741
S2
(5-10/1B)
S1
D700
X702
ABC27
24V_REL
* ON
* OFF
0V_REL
D711
230V(240V)~
240V_T1
230V_T1
208V_T1
N_T1
230V_STAND
N_STAND
0V_WECHSEL_T1
19V_T1
PRIM1_T2
PRIM2_T2
19V
0V
230V
P24V
0V_LAST
0V_LAST_T1
GND/0V
+24V
D740
5-10/3A
24V_AC1
24V_AC2
D704
U REG +5V
U REG +15V
U REG -15V
24V_FOC
0V_FOC
U1_24V
U2_24V
U1_+5V
U2_+5V
U1_+15V
U2_+15V
U1_-15V
U2_-15V
VCC
GND
P15V
AGND
N15V
-15V
+5V
+15V
STAND
X899
PE
N
L1
L2
L3
INCOMING MAINS
110, 208, 230, 240,
277 OR 400V
SINGLE OR TWO
PHASE
400V
2 PHASE
L1
L2(N)
F10
F20
20AT
Z3
SURGE
ARRESTER
VARISTOR
T10
T1
Z1
F1
1 AT
F2
4AT
F3
F4
0.5 AT
F5
F6
1.5 AT
F7
F8
1.5 AT
6.25 AT
1 AT
(5-6/2B)
(5-8/5C)
110V
1 PHASE
35AT
(F20)
208V
2/1 PHASE
230V
2/1 PHASE
240V
2/1 PHASE
277V
2/1 PHASE
NOTE: READ PAGE 4-1 BEFORE CHANGING
MAINS CONNECTION

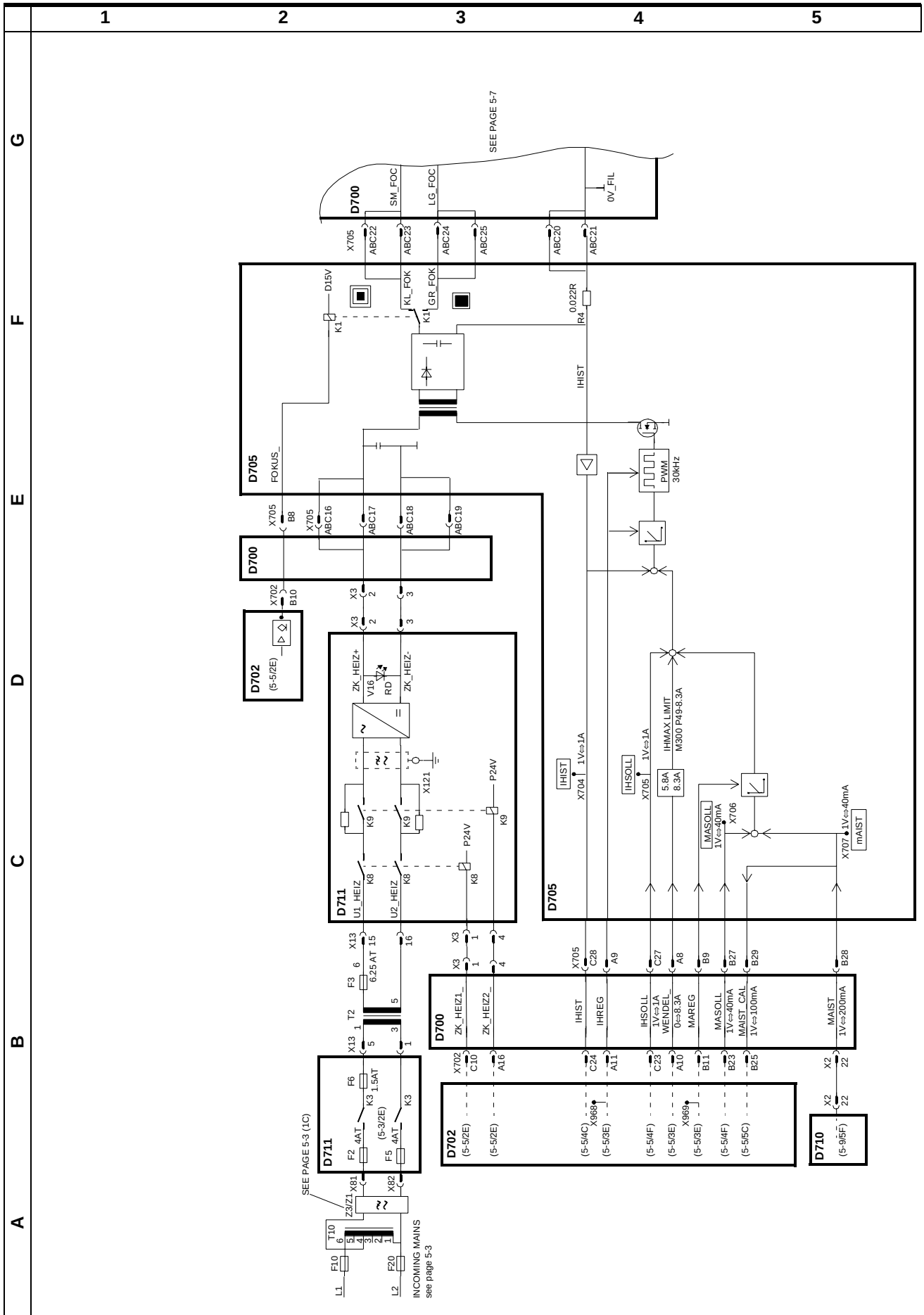
BACK PLANE D700



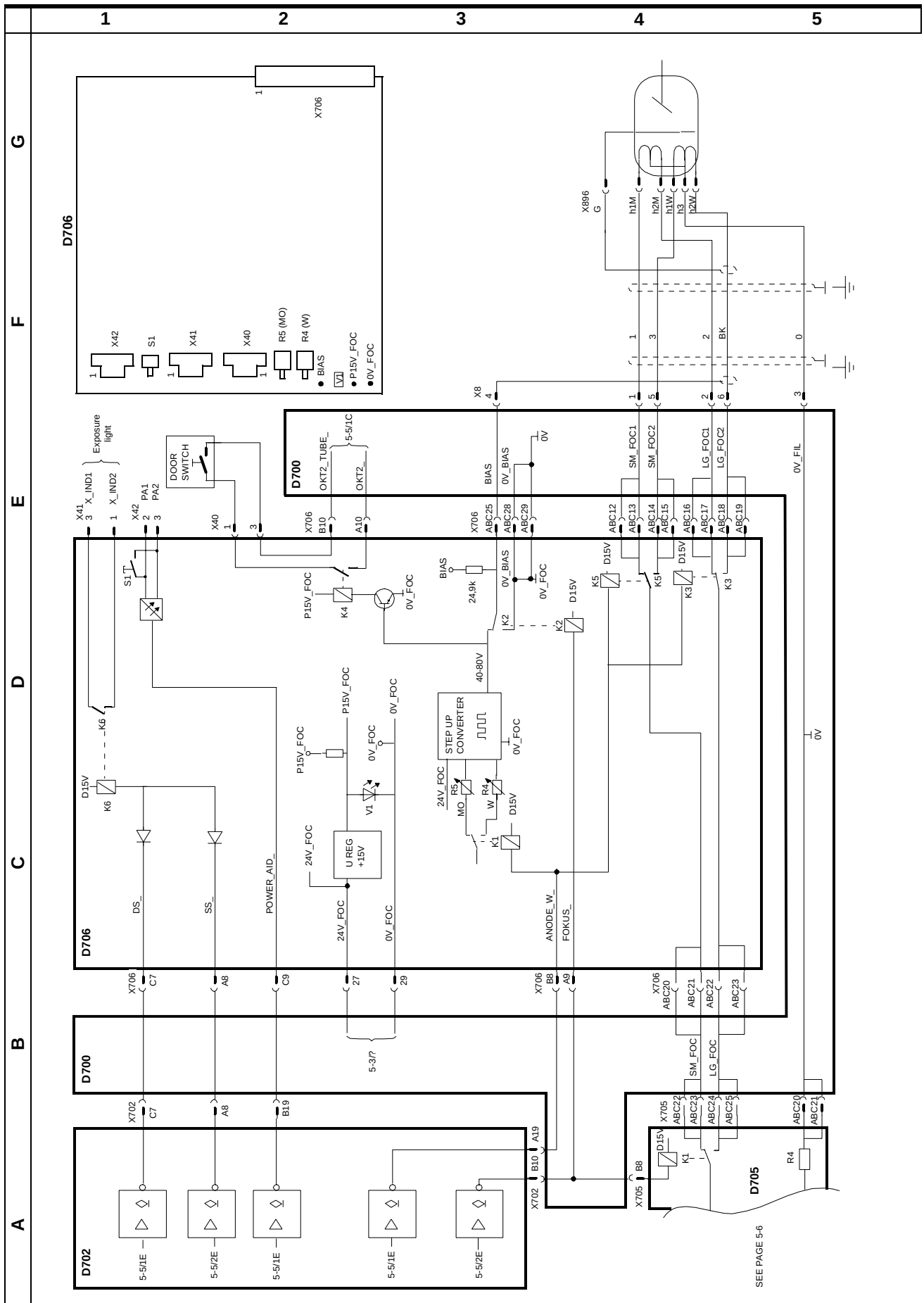
PRINCIPLE DIAGRAM, MASTER



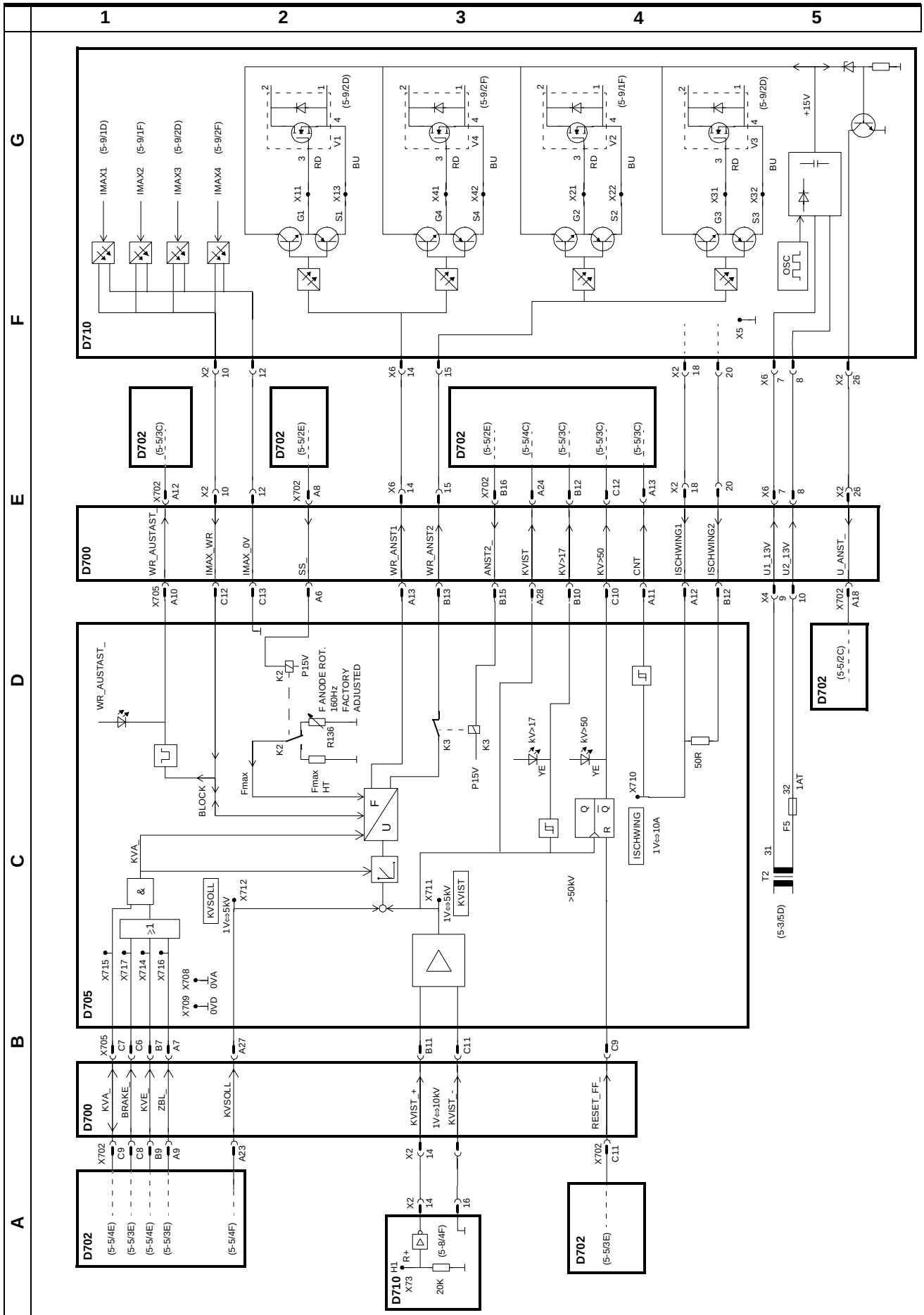
PRINCIPLE DIAGRAM, TUBE FILAMENT

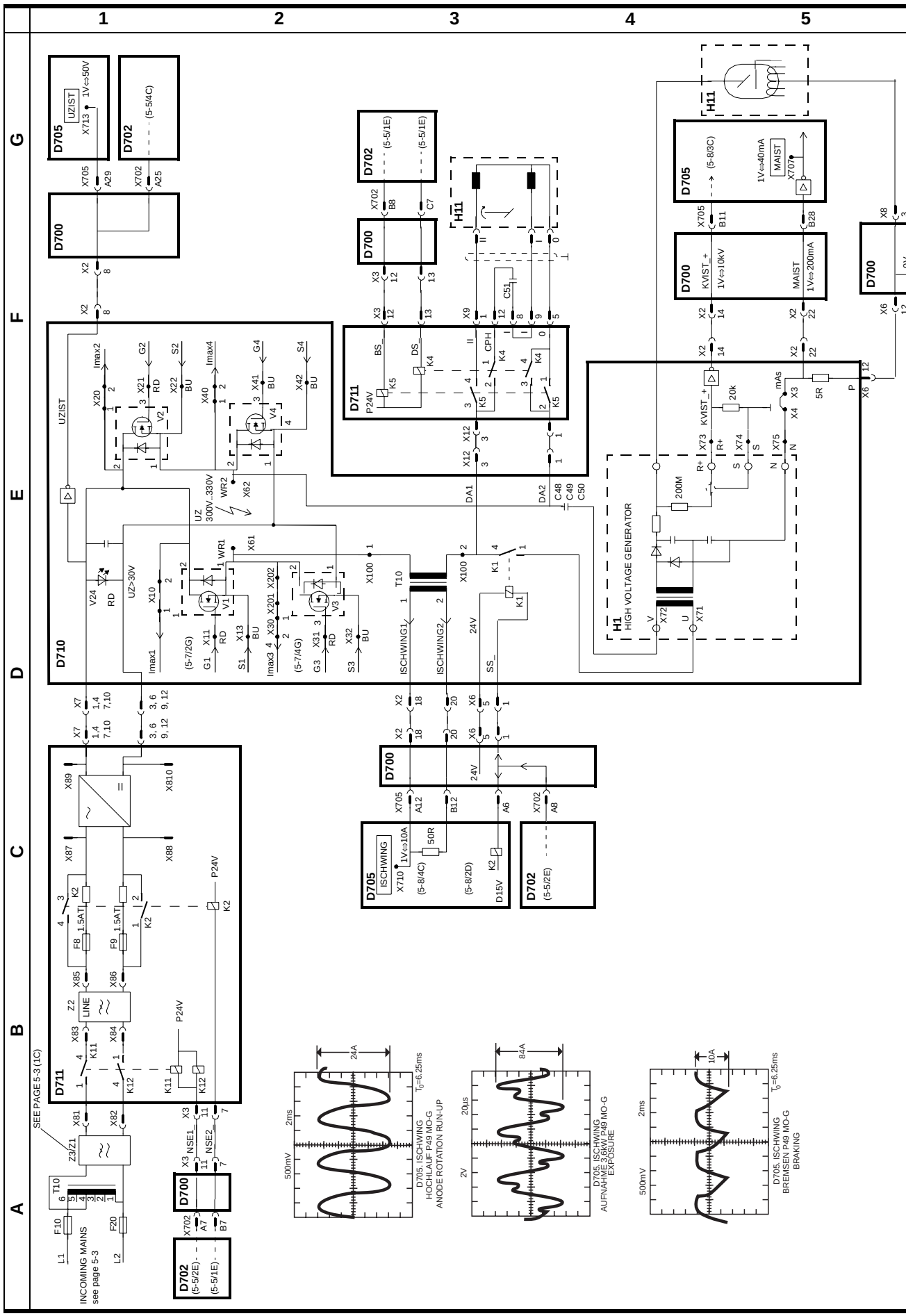


PRINCIPLE DIAGRAM, FOCUS SELECTION BOARD

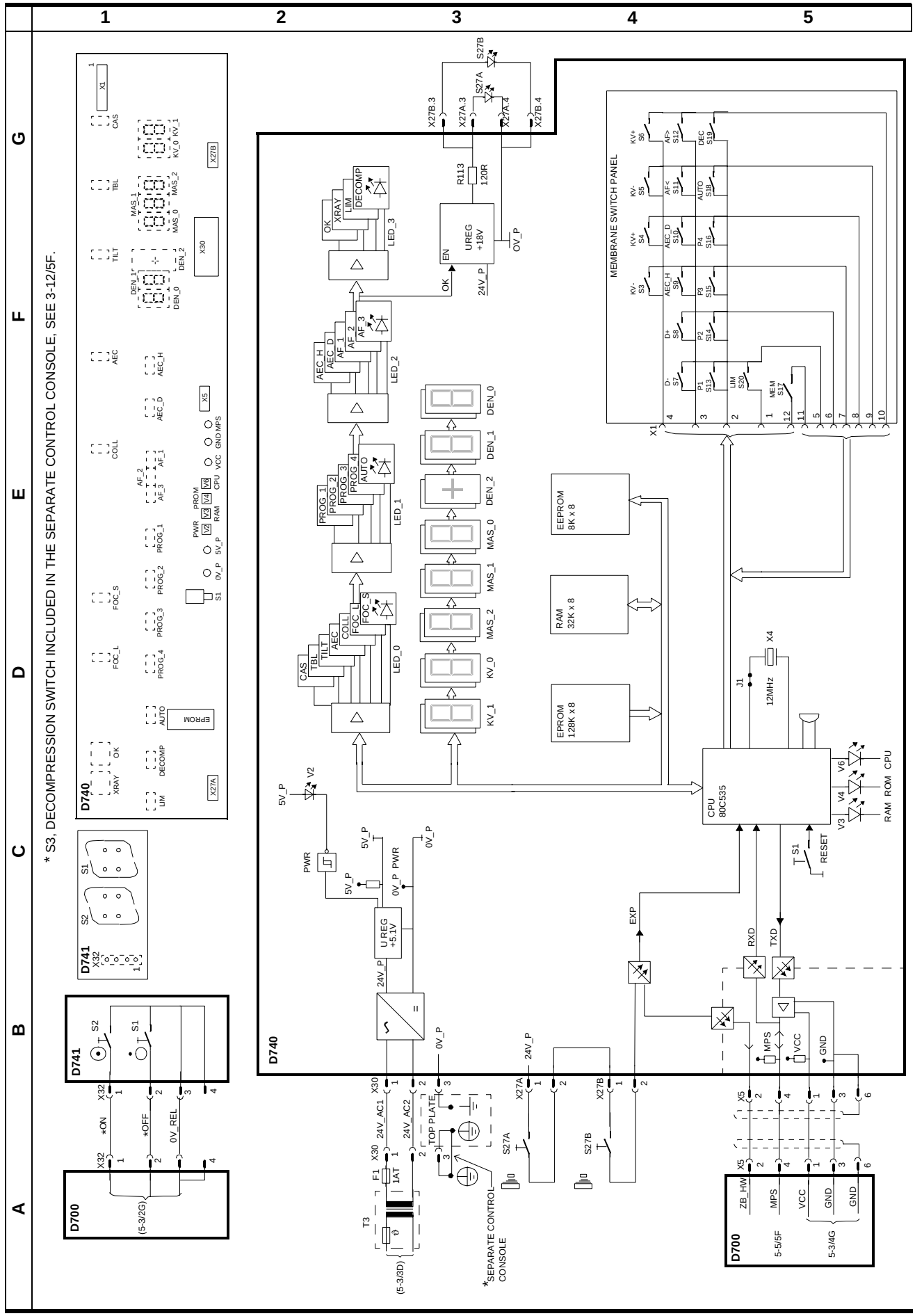


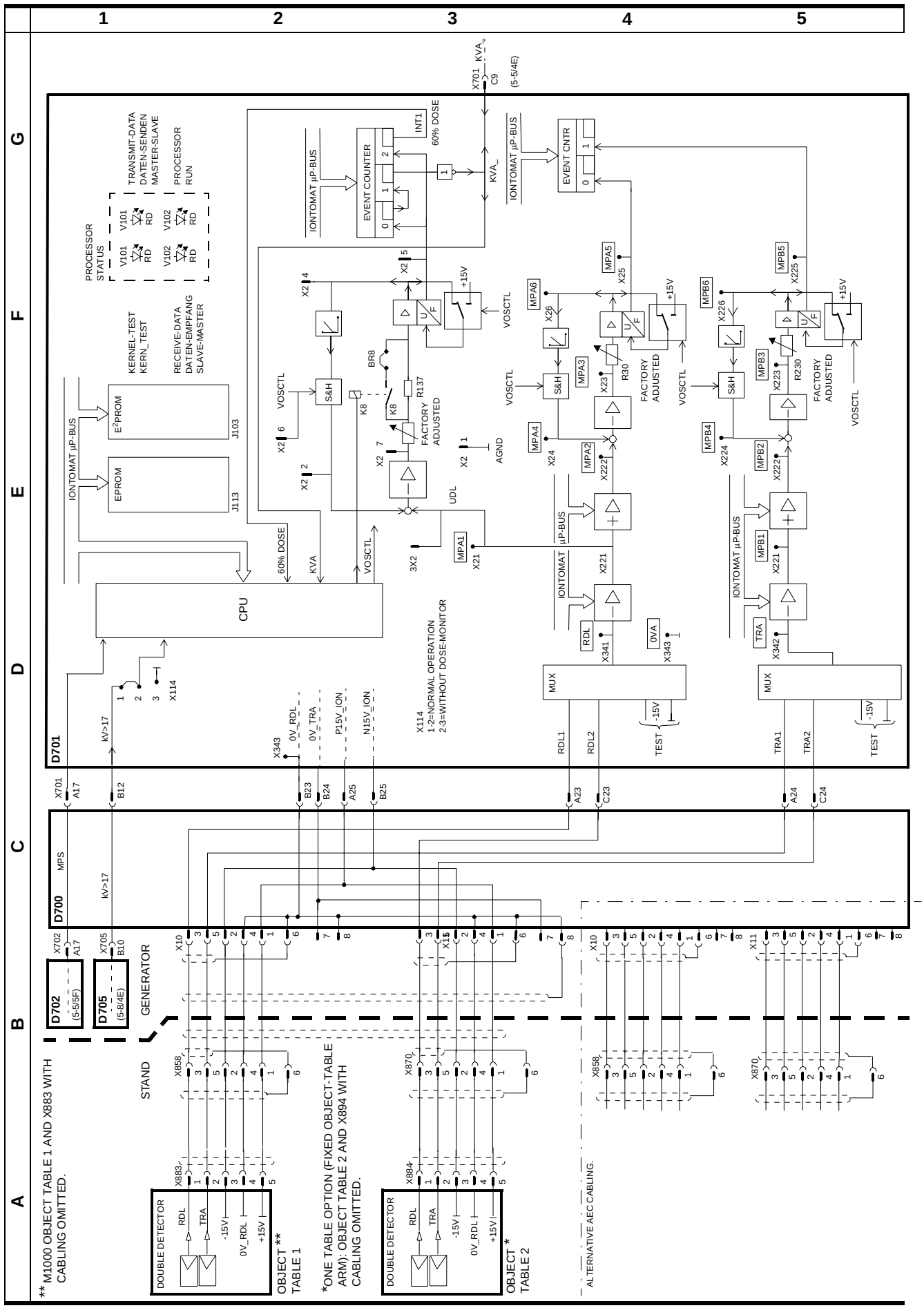
PRINCIPLE DIAGRAM, INVERTER CONTROL AND KV REGULATION




1
2
3
4
5
A
B
C
D
E
F
G
D705
UZIST
1V⇔50V
X713
D702
(5-5/4C)
D700
X705
A29
X702
A25
X2
8
D710
UZIST
Imax2
G2
S2
Imax4
G4
S4
X20
X21
RD
X22
BU
X40
X41
X42
V2
V4
UZ
300V..330V
WR2
X62
V24
UZ>30V
X10
WR1
X61
V1
V3
(5-7/2G)
(5-7/4G)
G1
G3
S1
S3
X11
X13
X30
X201
X202
X31
X32
Imax1
Imax3
X100
T10
ISCHWING1
ISCHWING2
K1
24V
SS_
DA1
DA2
C48
C49
C50
D711
P24V
BS_
DS_
K4
K5
CPH
C51
X12
X9
D702
(5-5/1E)
X3
12
13
B8
C7
H11
D700
D705
(5-8/3C)
1V⇔40mA
MAIST
X707
X705
B11
B28
KVIST_+
1V⇔10kV
MAIST
1V⇔200mA
X2
14
22
D700
X8
3
⊥0V
X6
12
H1
HIGH VOLTAGE GENERATOR
200M
KVIST_+
20k
mAs
5R
P
X3
X4
X73
X74
X75
R+
S
N
V
U
X72
X71
X7
1.4
7,10
3, 6
9, 12
X18
X20
X5
X1
D705
ISCHWING
1V⇔10A
X710
(5-8/4C)
50R
(5-8/2D)
K2
D15V
D702
(5-5/2E)
A12
B12
A6
A8
D711
SEE PAGE 5-3 (1C)
X89
X810
X87
X88
F8
F9
1.5AT
X85
X86
Z2
LINE
X83
X84
K11
K12
X81
X82
Z3/Z1
T10
F10
F20
L1
L2
INCOMING MAINS
see page 5-3
NSE1
NSE2
D700
D702
(5-5/2E)
(5-5/1E)
X702
A7
B7
24A
2ms
500mV
T_0=6.25ms
D705, ISCHWING
HOCHLAUF P49 MO-G
ANODE ROTATION RUN-UP
84A
20µs
2V
D705, ISCHWING
AUFNAHME P49 MO-G
EXPOSURE
10A
2ms
500mV
T_0=6.25ms
D705, ISCHWING
BREMSEN P49 MO-G
BRAKING

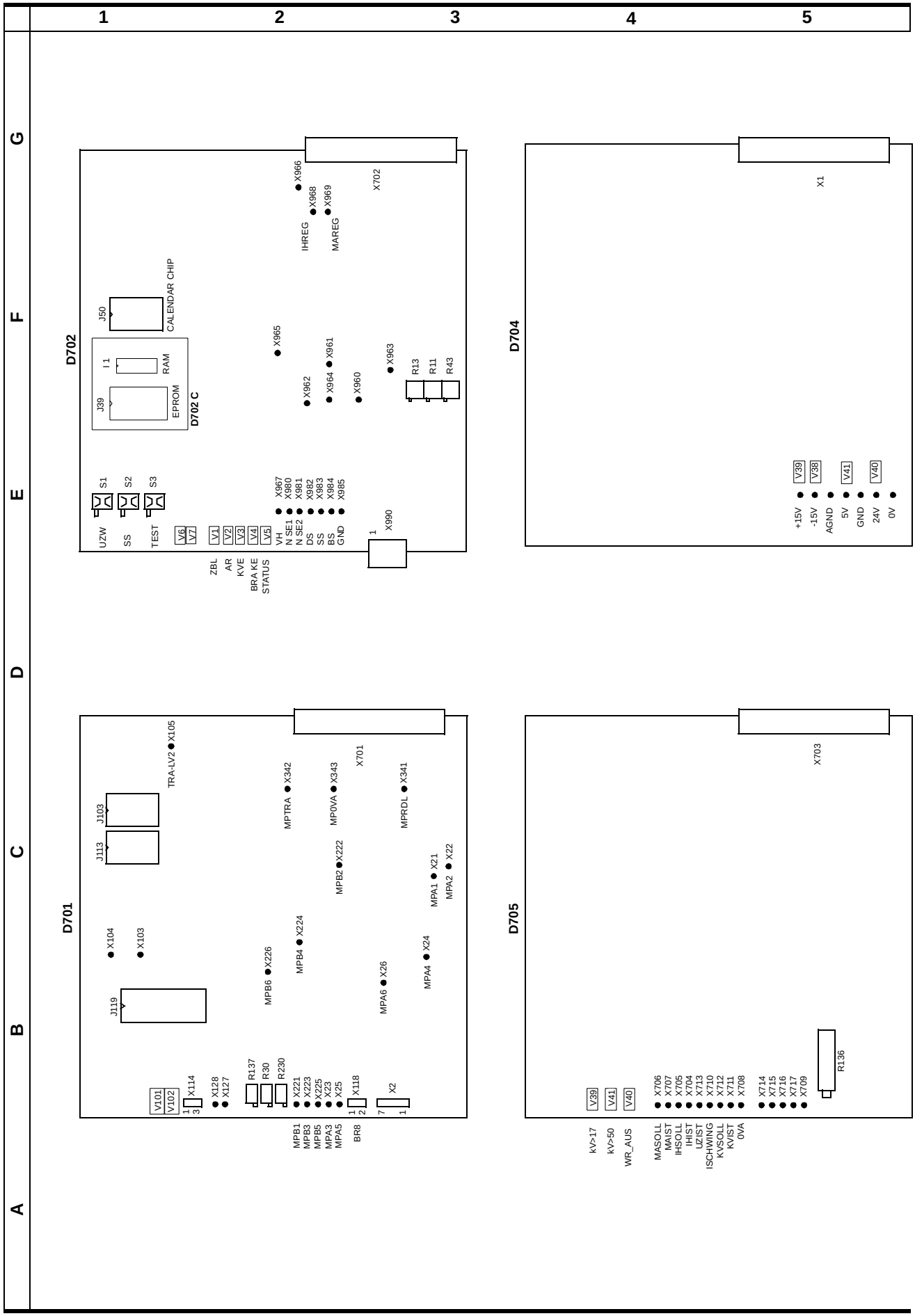
PRINCIPLE DIAGRAM, CONTROL PANEL




1
2
3
4
5
A
B
C
D
E
F
G
D701
D700 MPS
D702 (5-5/5F)
D705 (5-8/4E)
GENERATOR
STAND
CPU
E²PROM
EPROM
J103
J113
IONTOMAT µP-BUS
KERNEL-TEST
KERN_TEST
RECEIVE-DATA
DATEN-EMPFANG
SLAVE-MASTER
TRANSMIT-DATA
DATEN-SENDEN
MASTER-SLAVE
PROCESSOR
RUN
PROCESSOR
STATUS
V101
V102
RD
EVENT COUNTER
EVENT CNTR
INT1
60% DOSE
KVA_
X701 KVA_
C9
(5-5/4E)
VOSCTL
S&H
BR8
K8
R137
FACTORY
ADJUSTED
UDL
AGND
MPA1
MPA2
MPA3
MPA4
MPA5
MPA6
MPB1
MPB2
MPB3
MPB4
MPB5
MPB6
R30
R230
X21
X221
X222
X23
X24
X25
X26
X223
X224
X225
X226
+15V
-15V
0VA
RDL
TRA
MUX
RDL1
RDL2
TRA1
TRA2
TEST
X114
1-2=NORMAL OPERATION
2-3=WITHOUT DOSE-MONITOR
kV>17
0V_RDL
0V_TRA
P15V_ION
N15V_ION
X343
X341
X342
X10
X11
X858
X870
X883
X884
DOUBLE DETECTOR
OBJECT **
TABLE 1
OBJECT *
TABLE 2
** M1000 OBJECT TABLE 1 AND X883 WITH CABLING OMITTED.
*ONE TABLE OPTION (FIXED OBJECT-TABLE ARM): OBJECT TABLE 2 AND X894 WITH CABLING OMITTED.
ALTERNATIVE AEC CABLING.

	1	2	3	4	5
G F E D C B A	This page intentionally left blank.				

CONTACT LOCATION



CONTACT LOCATION